UNITED STATES ARMY

NOVEMBER 1969

AVIATION DIGEST

UNITED STATES ARMY AVIATION DIGEST

DIRECTOR OF ARMY AVIATION, ACSFOR
DEPARTMENT OF THE ARMY
MG John L. Klingenhagen

COMMANDANT, U. S. ARMY AVIATION SCHOOL
MG Delk M. Oden

ASST COMDT, U. S. ARMY AVIATION SCHOOL
COL Bill G. Smith

DIGEST EDITORIAL STAFF
LTC Robert E. Luckenbill, Chief
Richard K. Tierney, Editor
William H. Smith
Joe Lewels
Linda McGowan

GRAPHIC ART SUPPORT
Harold G. Linn
Harry A. Pickel
Dorothy L. Crowley
Angela A. Akin

DIRECTOR, U. S. ARMY BOARD FOR AVIATION
ACCIDENT RESEARCH
COL Eugene B. Conrad

USABAAR PUBLICATIONS AND GRAPHICS DIV
Pierce L. Wiggin, Chief
William E. Carter
Jack DeLoney
Ted Kontos
Charles Mabius
Mary W. Windham

12

18

26

52

NOVEMBER 1969 VOLUME 15 NUMBER 11

VIEWS FROM READERS 1
ARCTIC TEST OF THE CRANE, CW4 Curtis A. McVey 2
AN OBJECTIVE APPROACH TO MANAGEMENT MAJ Harold L. Jones 7
WILD BLUE YONDER, CPT Terry W. Bishop 10
JACK AND THE BEANSTALK, LTC Hubert Morris 12
TACTICAL INSTRUMENT TICKET PAYS DIVIDEND LT Gregory J. Dadak 16
"GROUNDED" EAGLE, LTC C. C. Norton 18
NIGHTHAWK, CPT Garrett C. Marcinkowski and CW2 Steven J. Zorger 23
THE KIOWA JOINS UP, MAJ Robert S. Fairweather 26
CHARLIE AND DANNY'S WRITE-IN 28
THE TIGER'S ROAR, CPT William E. Walgren 30
CAUTION: A HAZARD TO FLIGHT CPT Nathan G. Stackhouse Jr. 32
CRASH SENSE—TALCMOR, L. L. Bishop 36
TALES FROM THE TROJAN 41
PEARL'S 52
LOW FLYING SENSE, MAJ Chester Goolrick 54
USAASO SEZ 64
DO-IT-YOURSELF VACUUM CLEANER Inside Back

ABOUT THE COVER

The Crane climbs out of a valley during Arctic tests in Alaska.
(See page 2)

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Ala. 36360.

Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 3 November 1967.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-4 and send directly to CO, AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220. For any change in distribution requirements, initiate a revised DA Form 12-4.

National Guard and Army Reserve units submit requirements through their State adjutants general and U. S. Army Corps commanders respectively.

For those not eligible for official distribution or who desire personal copies of the DIGEST, paid subscriptions, $4.50 domestic and $5.50 overseas, are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

VIEWS FROM READERS

While processing the article "Wild Blue Yonder" (page 10 of this issue), it occurred to us that there is no place we know of where Army aviation slang words and terms are catalogued. Although most of these are unofficial and therefore not authorized in official correspondence, they are commonly used. A young soldier familiarizing himself with aviation phrases cannot get a complete list. Also many are of historical value and need to be recorded for posterity.

The DIGEST would like to see these words and phrases preserved. If you will send us a list of your favorite words and terms along with their meanings, we will see that they are kept and will prepare a feature article on some of the more interesting.

★ ★ ★

From June 1962 to June 1965, COL Robert M. Hamilton was director of USABAAR. During that time he was able to see many of the problems involved in the prevention of Army aviation accidents. He has since written a safety article entitled "Tell It Like It Is," which was published in the June issue of the DIGEST.

Recently the DIGEST received another view from COL William C. Boehm, then the Deputy Commander, 1st Aviation Brigade, Republic of Vietnam. He now has been assigned as Chief of the Airmobility Division, Director of Materiel, Combat Developments Command, Ft. Belvoir, Va.

COL Boehm has seen the Army aviation accident problem from the view of a senior commander in the field. Here's his letter—

Sir:

I would like to set the record straight regarding Colonel Robert M. Hamilton's article, "Tell It Like It Is." COL Hamilton states that the accident rates of non-divisional units in Vietnam has remained fairly constant for the last three to four years. This cannot be supported by records of the 1st Aviation Brigade, the principal non-divisional unit which possesses 50 percent of all of the aviation assets in Vietnam. A review of the 1st Aviation Brigade accident record for FY 1967 through FY 1969 indicates a 34 percent decrease in the aircraft accident rate, decreasing from 32.1 to 21.2 based on the number of accidents per 100,000 flying hours. It should also be noted that the number of combat flying hours has substantially increased, nearly doubling during the past three years. Flying hours and rates for the 1st Aviation Brigade for FY 67 through FY 69 are as follows:

Fiscal Year	Hours Flown	Rate/100,000 Flying Hours
1967	978,617	32.1
1968	1,699,980	26.9
1969	1,819,403	21.2

This reduction in accident rates shows what can be done by effective command emphasis and a dynamic safety program. The reduction also shows the value of experienced aviator leadership which is a reason why the brigade rates are lower than those of the divisional units.

The low Aviation Brigade accident rate and the trend for further improvement is all the more remarkable because it is being achieved in a combat environment under extremely adverse conditions. Some of these factors that affect the accident rate in Vietnam are as follows:

• Rugged terrain with triple jungle canopy in the III Corps tactical zone. This frequently means that assaults must be made in small openings which can only accommodate single ships. Such single ship landing zones provide minimum margin for error and the aircraft commander must be exceptionally skilled to correctly maneuver his ship avoiding branches and foliage.

• The density altitude in the highlands is another factor which reduces the margin for error.

• Environmental conditions in the coastal sandy areas, particularly during the lengthy dry season, pose numerous problems of FOD. Particle separators have been installed and are relatively effective but blowing sand and dirt have a deleterious effect on aircraft parts. Hangar facilities and other covered areas are quite limited.

• Many losses are directly associated with the tactical requirement. For example, Hunter-Killer team employment involves low and slow flying over jungle terrain with minimum forced landing areas available during inflight emergencies. Abrupt evasive flight maneuvers result in some accidents when attempting to avoid enemy fire during insertions and extractions of ground troops. Losses also occur due to low level flights over jungle terrain. Such flights are frequently required to draw enemy fire and to locate enemy positions.

• Unimproved landing areas are used for both rotary and fixed wing aircraft operations. Many landing zones are restrictive and surrounded by high trees and contain hidden obstacles.

In spite of all of these difficulties, the record of the 1st Aviation Brigade has

Continued on page 15

Arctic Test of the Crane

The Army's CH-54 was operated in temperatures from 46 above to 43 degrees below Fahrenheit in Alaska...

. . . to subject the aircraft to the most realistic winter conditions possible, the Crane was used to support various units and participated in a winter field exercise. It easily moved loads like the personnel carriers at left. Much interesting data was obtained and should be beneficial to CH-54 crews recently deployed to Europe. For example, problems were encountered because the skis had to be kept in a toe-high attitude . . . or else (upper right)

CW4 Curtis A. McVey

THE CH-54A recently completed cold weather tests that further endorse the versatility of the Army's huge Flying Crane.

While some problem areas were uncovered in the test conducted last year at the U. S. Army Arctic Test Center, Ft. Greely, Alaska, none were of such a critical nature that they could not be offset.

During the test the 20,000 pound helicopter was operated in temperatures ranging from 46 degrees to minus 43 degrees F and was flown from flat snow covered terrain, frozen river beds, mountain tops, frozen lakes and snow covered hills.

To subject the Crane to actual on-the-scene type missions, the helicopter also was used to support a winter field exercise, provide support to the Arctic Test Center and to furnish general heavy lift support to other units in Alaska.

The "Arctic" Crane used in the test was a conventional type with a few small modifications. It was equipped with skis to support its heavy weight in deep snow, slush shields to prevent the engine from ingesting ice, a 4,000 pounds per square inch (psi) accumulator for faster auxiliary power plant starts and a 100,000 British thermal unit (BTU) cabin heater.

The most serious problem encountered was the whiteout which occurred when landing and taking off in areas covered by loose snow. Downwash from the blades blew loose snow which encircled the aircraft in a blanket of white. Since the snow is the same color as the ground, a whiteout condition formed and usually resulted in the loss of ground reference. The problem seemed to increase in direct proportion to the weight of the aircraft.

The condition became critical operating at or near the aircraft

Arctic Test of the Crane

gross weight when sufficient power was not available for a go-around or high hover.

Certain techniques were employed to counter the whiteout problem and for the most part worked well. In an empty takeoff when the amount of power required to taxi the aircraft is great enough to cause a whiteout condition, the situation is greatly aggravated if the helicopter is brought to a hover. To combat this the helicopter was lifted rapidly to a high hover to get above the blowing snow (approximately 50 feet). Or, if a ground reference was not available, an instrument takeoff was made.

In a four-point or pod takeoff the helicopter was hovered over the takeoff point prior to load hookup to blow away the loose snow. If this was not practical, a vehicle or other heavy dark object was moved in front of the helicopter at a 45 degree angle approximately 50 feet from the pilot's position. This made an excellent reference point until the snow was blown away enough to make a safe VFR takeoff. The object selected for a reference must be heavy enough to withstand the downwash from the blades without being blown away or drawn into the rotor system.

For a single-point takeoff, the CH-54 was hovered directly over the load to blow away the loose snow prior to hookup or the aft facing pilot used the load itself as a reference during hookup. By the time hookup was accomplished using the latter technique, the loose snow was usually blown away. If not, the application of power with the load on the ground blew the snow away prior to attempting the takeoff.

When making an empty landing an area was selected with a dark object such as a tree, stump, rock or vehicle to use as a reference point. The approach was set up to keep the reference at a 45 degree angle to the pilot's position upon termination. If the reference was at the front of the aircraft instead of to the side at termination, an overshoot of the approach would cause the reference to be lost to the pilot's view as the aircraft passed over it. If a landing point with a ready made reference was not available, either a roll-on type landing was made or else the approach was terminated at a high hover which was maintained until the loose snow was blown away.

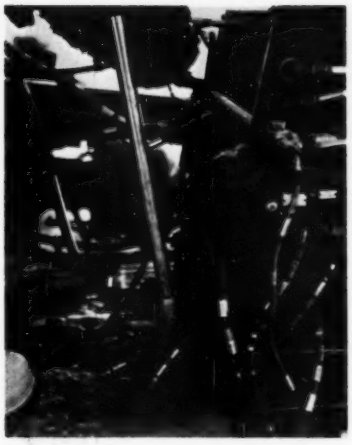
In a four-point or pod landing an empty helicopter would hover over the intended landing point to blow away the loose snow. If a helicopter were not available, a vehicle was moved into position to be used as a reference. A third alternative was to make a roll-on landing if the terrain permitted.

In a single-point load landing, techniques were the same as for the four-point or pod landing, except of course for the roll-on landing. It should be stressed that a single-point load landing can be critical without a definite reference object so the approach and touchdown should be well planned. It may even be worth while to select another landing point than to go in without a good reference point.

An empty, pod or four-point roll-on type landing was very useful in flat, open, snow covered terrain. Care must be taken however to ensure that the skis are in a toe-high attitude so that they will remain on top of the snow during the slideout. If they are not, the skis have a tendency to dig into the snow where they may contact rocks, brush and other hidden objects. A toe-high attitude could not always be maintained on the skis with the bungee cords that were

A truck is used as a reference point for a CH-54 landing during tests in Alaska. Downwash from the blades swirls the snow which can encircle the aircraft and cause a dangerous whiteout situation

Many small problem areas were uncovered during the testing of the Crane. The hand hold handle of the aft pilot's cabin was too small (left) and the main landing gear steps were too narrow (right). Also, the APP's manual pump handle had to be extended 3 feet (below)



installed for this purpose. A spring or a shock strut would probably be better. Also, a small wheel on the heel of the ski could serve to level the skis for taxiing on hard surfaces.

While in the slideout portion of the landing, just enough forward speed (10-15 kts) was maintained on termination to keep the blowing snow behind the cockpit area and the touchdown was made prior to the loss of ground reference. As the helicopter became firm on the snow, power was gradually reduced and a level attitude and constant heading was maintained with reference to the cockpit instruments.

One important malfunction occurred early in the testing. It was found that the cold temperatures resulted in abnormally high transmission oil pressures during auxiliary power plant (APP) starts, causing the transmission oil strainer bowl "O" ring seal to unseat. This resulted in the loss of transmission oil. The problem was corrected by installing an additional bypass and pressure relief valve which relieved high transmission oil pressures during APP starts.

Another problem with the APP was uncovered when it was discovered that the manual pump handle was not long enough to provide the leverage needed to pump the auxiliary power plant accumulator to the required 4,000 psi. A 3-foot section of pipe was used as an extension to the handle and solved the problem.

The main landing gear steps constituted a definite hazard—being too narrow for the Arctic vapor barrier boots usually worn in extreme cold areas. No changes were made in the steps during the tests but maintenance personnel were cautioned to have a definite hand hold at all times while using this means to go up or down the helicopter.

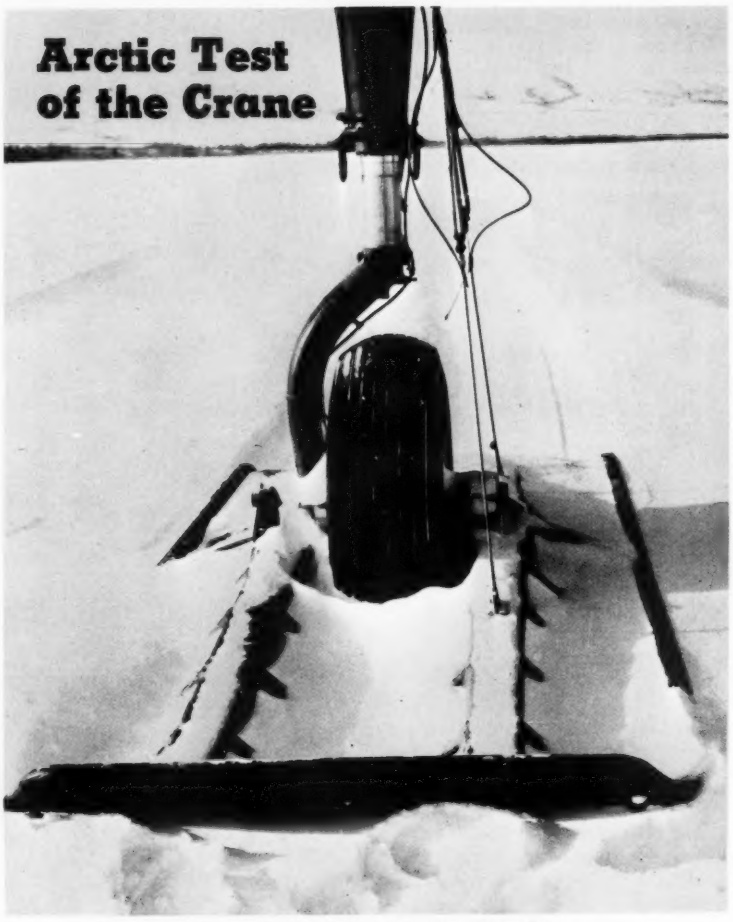
Similarly, the hand hold handle of the aft pilot's cabin was too small for use with the Arctic mittens. Test personnel had to remove their mittens to use the handle.

During manual refueling of the aft and auxiliary fuel cells, ice and snow presented a hazard to personnel standing on the levellizer braces. However personnel were advised of the dangers involved and to exercise due caution. A work platform that could correct this problem is in the supply system but was not available during the Arctic tests.

Ground personnel and hookup crewmembers were faced with subzero chill factors caused by low ambient temperatures and high wind conditions from the rotor blades. A chill factor chart should be consulted to determine the current chill factor. Ground personnel should dress accordingly and wear goggles for eye protection.

In northern latitudes the Flying Crane seems to store very large amounts of static electricity. This buildup appears to be in direct proportion to the gross weight of the aircraft and resultant increase in blade angle. To help counter the danger of being shocked, the hookup man should use a grounding cable during single-point load operations. He also must keep the cargo hook in sight at all times to guard against electrical charges which have been known to arc up to 8 inches from the hook to contact personnel working nearby; it is possible to receive a serious shock without ever touching the aircraft.

On three separate occasions during the test, the N_1 (gas generator) speed would not retard below 50 percent N_1 during engine shutdown. The expansion and contraction rate of the fuselage and the N_1 cable was suspected as the prob-



The "Arctic" Crane equipped with skis

able cause. To solve the problem, tension on the N_1 cables was increased to the maximum allowable.

During extremely cold weather the N_2 trim switches failed to retard the N_2 (free turbine) speed properly. This occurred in temperatures of minus 24 degrees F and lower, however, it did not affect the increase in N_2. No corrective action was taken but the cause was probably the cold temperatures affecting the actuator lubricant.

Personnel wearing heavy Arctic clothing had some trouble entering and working in the attic compartment. Consequently, it was recommended that a 20 by 23 inch inspection plate should be added aft of station 210 to allow entry from the outside. This modification also would prove helpful in hot climates where extreme temperatures are a problem.

The Crane was difficult to tow in snow depths of 6 to 10 inches, even on hard surface parking ramps. Forward movement could be maintained until the landing gear came in contact with 10 inch drifts. Then the towing vehicle lost traction and was unable to move the helicopter. Towing even on snow covered ramps should be done with a 3/4 ton or larger vehicle equipped with chains. If the snow depth is 12 inches or greater it is recommended that the aircraft be taxied or hovered.

Engine air particle separators (EAPS) were not available on the test helicopter. They would have been helpful on some missions but would have to have an anti-ice capability.

No conclusive data was collected on slush shields since the test helicopter never encountered ice accumulation on the windshield. In one instance a small flock of birds flew up into the rotor system but did not enter the engine intakes. The slush shields probably kept them out.

During an attempt to load a 155 mm howitzer into the universal pod, it was found that a heavy weight on the rear of the pod caused the front of the pod to lift off the ground, damaging the angle chine area. Sandbags under the ramp and rear of the pod prevented further damage.

No problems were encountered with the 4,000 psi accumulator but it was noted that this larger accumulator provided a much faster start, resulting in better clutch engagements.

During the initial phase of testing, the APP would not start after exposure to freezing temperatures. Moisture and corrosion were found in the 90 percent speed switch. Replacement of this switch corrected the problem.

The techniques employed during the conduct of the test proved satisfactory in the dry snow of the Arctic and should prove beneficial in other winter climates where blowing snow is a problem.

It should be remembered, however, that the test was made in dry cold. Operations in a damp winter climate could add other hazards such as moisture freezing in blades, moisture freezing on components and severe inflight icing conditions.

an objective approach to

Management

A new method in aviation maintenance management provides the commander with a simple way to measure the quality of the work being performed

Major Harold L. Jones

THE REASON SOME units have maintenance problems is that the operations officer, the commander, the maintenance officer and others in the unit are often singing from different sheets of music. If the maintenance officer's idea is to produce aircraft which are as close to perfect as he can get them, and the commander is one who wants more and more flyable aircraft, then there's going to be a conflict of sorts.

Imagine a horizontal scale with "Quality" on one end and "Availability" on the other. The maintenance officer just described is on the quality end and the commander is on the availability end. The possibility of the maintenance officer and the commander failing to have an understanding as to where the unit should fit on the quality-availability scale could be a source of continual conflict.

One of the reasons that reaching this understanding is so difficult is that although there's a simple and obvious method of measuring availability—the number of flyable aircraft provided every day—there's no simple way to measure the quality factor. On the availability end of things there's the direct, quantifiable measure—13 of 20 flyable—but, again, how do you measure quality?

Sometimes unquantifiable factors can be measured by indirect means. For example, the Army has long measured morale through indirect yet quantifiable means: the AWOL rate, Article 15 rate, court-martial rate, etc. Can we develop a similar quantifiable measure of quality standards by measuring such things as the mission abort rate, precautionary landing rate, forced landing rate, number of accidents caused by maintenance error or by materiel failure which resulted from inspection failure, the number of times in a month it was necessary to dispatch a maintenance aircraft to the aid of a sick aircraft for any reason other than pilot or crewchief ineptness? If we could develop such a measure (and it appears from the number of hours that are being flown daily that we could) and if we initially assigned arbitrary value figures to each of these occurrences, such as are shown in the chart below, then we could measure quality rather effectively and easily (Figure 1).

Then if a unit had four aircraft during the month which missed their takeoff times by 15 minutes or more, the unit's point accumulation would be 1 point times 3 (for the first three delay aborts) plus 2 points times 1 (for the fourth occurrence), or a total of 5 points. If the same unit had a forced landing (4 points), a precautionary landing (3 points) and sent out a maintenance crew ("wrecker") twice (6 points), the unit would have accumulated a quality rate of 18 points for the month (Figure 2).

If this unit's commander was satisfied with this performance in view of the urgency of his mission and the number of flying hours expended, then he could establish goals or objectives for his mainte-

QUALITY MEASUREMENT

Measure	Point Value per Occurrence		
	1-3	4-6	7 plus
I. Mission aborts	1 each	2 each	3 each
II. Precautionary landings	3 each		
III. Forced landings	4 each		
IV. Accidents	5 each		
V. "Wrecker" trips	3 each		

Figure 1

nance officer. He could call in his maintenance officer and say, "John, next month is going to be a tough one. I'm going to ask you to increase availability from 65 percent mission ready to 75 percent mission ready, but I'm prepared to accept a quality rating of 20 points during the month. And for your supply planning, John, we will probably average 115 hours per UH-1D during the month." Then, of course, the negotiations could begin.

Quality rating is not just another gimmick with which to hang a maintenance officer. The good maintenance officers will find ways to keep the quality point rate within reasonable limits and use this new tool to better identify those crews (pilots and crewchiefs) who are working against the team by unjustifiably refusing aircraft, or who are not properly inspecting their aircraft and are thereby jumping the quality rate by the points assessed for a "wrecker" trip or for a precautionary or forced landing rather than taking 1 point for a delayed takeoff or a mission abort. Unless the aircraft is just out of scheduled maintenance, the mission abort figure, and in some cases the wrecker rate, is a direct reflection on the crewchief.

What's the corrective action for the maintenance officer? Obviously, there might be several answers: new crewchiefs, a training program for the crewchiefs, a training program for the pilots, re-examination of flight line inspection standards and techniques, etc. If the situation cannot be corrected after a reasonable period of time—say 3 to 6 months—what's the answer for the commanding officer? Again, there are several answers: it could (and probably should) "reflect"; there might be a new maintenance officer; or, if the commander were convinced there were factors involved which were completely beyond the maintenance officer's control, the commander could act accordingly and use command influence to solve some of the problems. But if the unit commander allowed maintenance to produce erratic availability and quality rates for four or five months without showing a definite increase or an improved trend toward stability, then it's up to the battalion commander.

Commanders are going to have to be knowledgeable and realistic in setting quality rate goals. If a combat unit commander sets a quality rate objective of zero, then he's simply attempting to abdicate his responsibility.

The purpose of the quality rate is to allow the commander and his maintenance officer to get together to set the unit's objective, quantitatively. The whole point of this exercise is to get each and every unit to consider, discuss, negotiate, bicker over, recognize and establish the unit's *objective*—at least as far as maintenance is concerned. If the maintenance officer develops an understanding with his key subordinates on the number of aircraft and the quality he is to produce, and if the commander accepts this objective, then the entire maintenance element has a goal and the commander has an effective means of measuring his maintenance element's performance. The key is to get the participation of the people who are going to be doing the "goal reaching" when the "goal setting" is being done. Then everyone is on the team and chances are if the goal isn't reached it won't be for lack of effort. If it isn't reached then it was either set too high or unpredictable outside factors unfavorably influenced the effort. Or maybe someone (and it could be anyone from the commander down) wasn't leading or following as much as they should have been.

If every aviation unit commander, operations officer and maintenance officer would get together and discuss and establish reasonable objectives—objectives which would ideally require some stretching to reach—then all would benefit. To set reasonable goals the commander and the operations officer would have to have a realization of the problems

The objective of using the quality rate system is to permit the setting of realistic maintenance goals

which have to be overcome to achieve the goals. By setting the goal with the participation of the maintenance officer, the commander has set a standard by which the maintenance officer may be legitimately judged. The maintenance officer gains from having the objective clearly defined and understood. He will do well then to develop his plans and organization, his direction and control and to coordinate the total effort to achieve the goal. The earlier the maintenance officer can enlist the aid of his subordinates, the better off the unit will be.

Then the unit is working as a team and the commander and the maintenance officer are managing.

Although the quality-availability objective this unit has set for itself is important, it is certainly not the only objective that the unit has, or even that the maintenance element has or could have. The maintenance officer and his subordinates could establish similiar quality measurement charts for such objectives as:

- keeping each set of aircraft records at a desired standard—deducting points for errors
- having every repairable component turned in to the proper agency within a 48- or 72-hour time frame, properly prepared for shipment and correctly tagged
- establishment of a 100 percent inventory of tools, spare parts, aircraft equipment, etc.—within specific intervals, within a set time frame.

The list of worthwhile objectives for a maintenance element is a good-sized list.

The commanding officer of the aviation unit can also set other objectives with the participation of flight platoon leaders and other key personnel. In fact this approach to management, known variously as "management by objectives," "management by results," "goal-orientation" and by several other names, offers a great deal of promise. It's application is not limited to aviation operating units. It's just as applicable to direct and general support companies, in staff level operations at battalion, group and higher levels and it could even work in Table of Distribution organizations. As much as it is a management approach, management by objectives is a leadership technique long recognized intuitively by some, but now made rational for many.

There's a bottom to the barrel from which we keep pulling Hueys. The better care we take of the aircraft we now have, the longer they will last. Depending on the situation, our maintenance can be improved through proper management approach.

Figure 2

MONTHLY QUALITY RATE

I.	Mission aborts	5 Points
II.	Precautionary landings	3 Points
III.	Forced landings	4 Points
IV.	Accidents	0 Points
V.	"Wrecker" rate	6 Points
		18 Points

Most foreign students assigned to flight school in the United States have received some basic instruction in English. The ability to speak some English is a prerequisite to their being assigned. But the English they know is limited and usually consists of only the simple everyday words that have been part of our language for a long time.

English, however, is a living language. It's growing. Every day new words are introduced. An important source of new words is the aviation society, which seems to be trying to create a new language all its own.

Foreign students at our aviation schools find these new words very confusing and hard to understand. Such expressions as "flame-out," "had it made" and "panic button" are either meaningless or conjure up an entirely different meaning to them. On the flight line, or while flying, use simple, everyday words or expressions that will get across the message "loud and clear."

AN ALLIED SOLO student flooded the engine of his aircraft during the starting procedure. A passing instructor pilot (IP) recognized the problem and came to his assistance. He showed the student how to pull the mixture control to the off position and to crank the starter to clear the cylinder of excess fuel. Using this method, the student was able to start his aircraft.

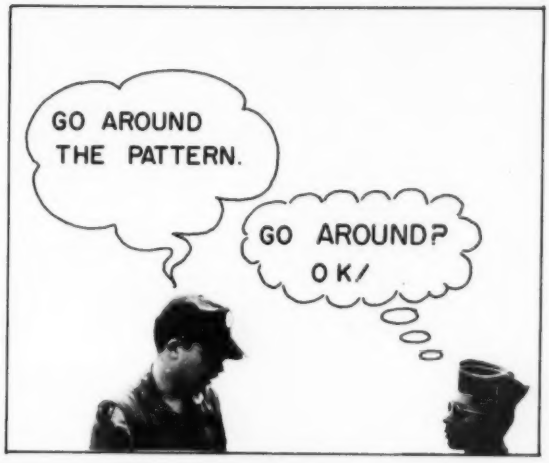
During a dual ride the next day, the student astonished his instructor by insisting that the starting procedure had been changed and the correct way now was to start the engine with the mixture control in the full off position.

This is an example of the language problem that faces the IP with a foreign student. These students come to the United States already able to speak some English—a language used around the world in business and commerce and taught in most foreign schools. In most cases though, the English taught in the schools throughout the world is the "King's English" and not that which is used by most Americans. Since both the student and the instructor speak the same language, it may lead to the mistaken idea that both can communicate with each other. This is not necessarily so. Americans have a hard time understanding a Cockney and vice versa.

Americans even have trouble understanding each other. Many southerners are confused by the sharp, clipped speech of the New Yorker, and many folks from above the Mason-Dixon line find the southern drawl hard to understand.

Many of our professional and semi-professional people have developed an "inner sanctum" language apparently designed only to confound and impress the layman. They use words and phrases like "order of magnitude," "state of the art," "in an expeditious manner," "facilitate the activation of," "integrated time-phased finalization" and "dependent on system parameters." These terms only confuse the average American, and the Allied student is even more confused.

Keeping company with these illiterate professionals are many people in Army aviation. They have fallen into the rut of vague, ambiguous, technical jargon which is sometimes annoying and in our business downright dangerous. This jargon can confuse any student, foreign or American born, when they are concentrating on learning to fly an unfamiliar aircraft.



When talking to foreign students stay out of the

WILD BLUE YONDER

Captain Terry W. Bishop

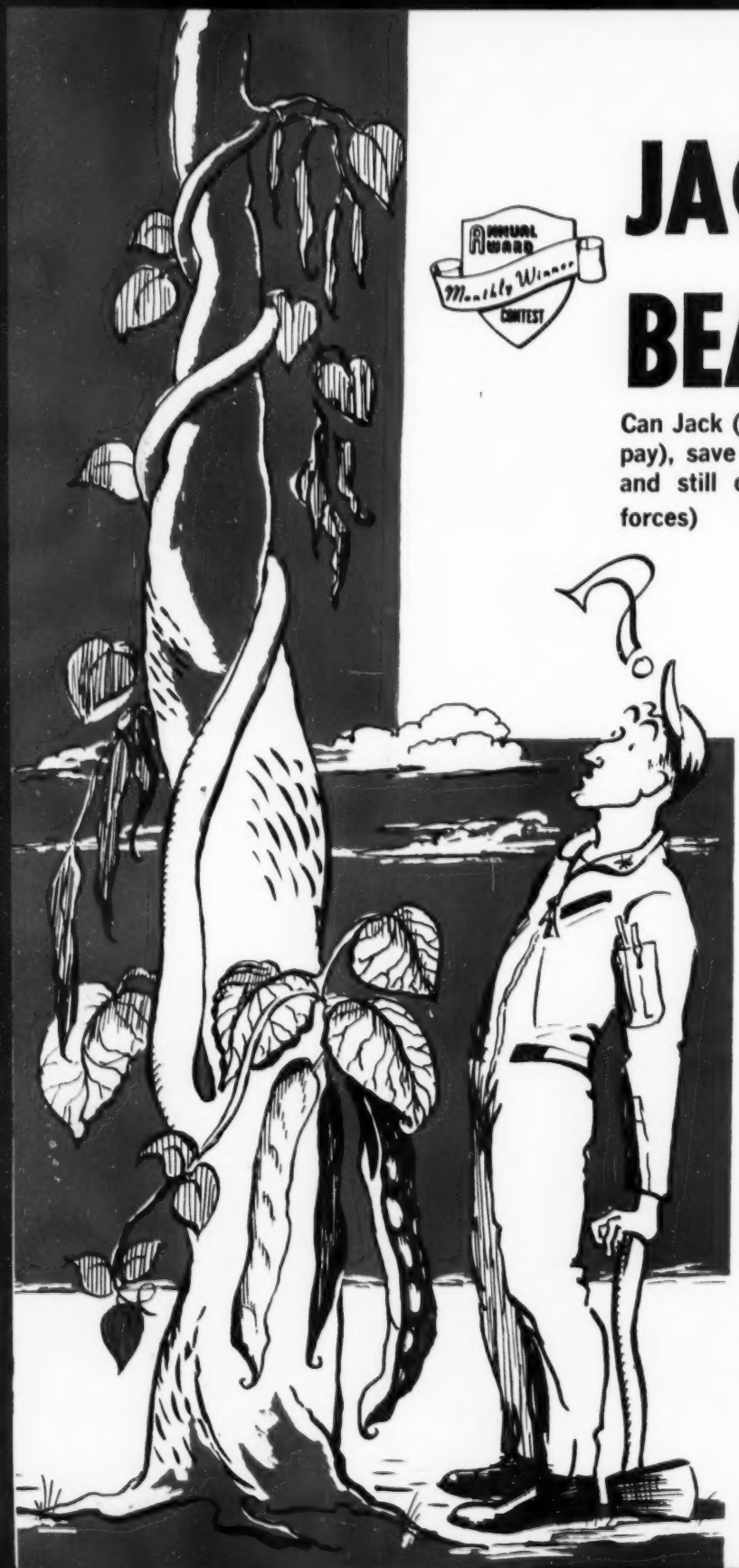
When an instructor refers to the cyclic as a "joy stick" or even to over-controlling as "wiping out the cockpit" it can be an exasperating period for the student. There is time enough for these ultra-cool terms but in the early stages of training they confuse rather than dazzle the student.

There are many instances on record where a foreign student misunderstood his instructor pilot. A typical example is the one where the IP demonstrates several approaches to minimum lighting and then allows his student to fly the pattern a few times himself. Satisfied that the student can perform satisfactorily the instructor allows the student to fly solo with the sporting comment, "Go around the pattern three times and return to this spot and pick me up again." A rather simple statement, or is it? The student follows these directions by making three consecutive go-arounds before landing to pick up his bewildered IP.

The examples used here are not meant to poke fun at the Allied student, but rather they are used to point up some weaknesses in our teaching methods. It must be remembered that some students will take a statement or action literally. It should also be said that sarcasm or humor can sometimes be very confusing to many students. They find nothing funny in many of our local jokes and may even be insulted. The taboos along this line are so numerous that it's almost impossible to list them all. The IP should study area handbooks and other publications to familiarize himself with these "do's and don'ts" before attempting to teach an Allied student.

Another confusing problem to the foreign student is the emanations from the control tower. In most cases the equipment in the tower is not designed to have a high-fidelity sound transmission. Add to this the occasional annoyed mike technique used by the controller and you have a very confused student.

Teaching Allied students can be a very rewarding experience and it can make an instructor examine his technique more than once. With this in mind let's let these visiting students teach us to be better instructors. A clear explanation is essential regardless of the student's home country. With the precision tool of a clear and complete explanation, the instruction will improve and more important the student will be a better pilot. Turning out *students* is one thing, but an instructor pilot's goal should be to produce the very best possible *aviator*.



JACK and the BEANSTALK

Can Jack (you) keep the goose (incentive pay), save the beanstalk (Army aviation) and still cope with the giant (internal forces)

Lieutenant Colonel Hubert Morris

REMEMBER JACK who grew the huge beanstalk which led him to a tussle with a giant over a goose that laid golden eggs?

Jack—you may recall—had developed quite a problem for himself. He could go after the goose and face the wrath of the giant or he could abandon the quest and lose the loot.

What should he do? Should he try to keep the goose and later be forced to destroy the beanstalk? Should he let the beanstalk stand and be crushed by the giant? Was there another course of action? How could Jack keep the goose, let the beanstalk stand and avoid the threat of the giant?

Every parable, no matter how humble, is sufficiently vague to require explanation. Let's examine the characters in our fairy tale. Jack, of course, is you. The beanstalk is Army aviation. The goose is obviously, by inference, your incentive pay. The giant is a bit more difficult to identify. He can be a reduced budget, a reduction in force, a legislative act or an administrative decision from within the Army structure.

What am I talking about? Let

me switch from fiction to fact. We in Army aviation are faced with a real and pressing problem. The almost magic growth of Army aviation has vastly increased the number of aviators in the force structure. Many of these aviators can and are being released to career oriented jobs outside of aviation. This is highly desirable if we are to compete with our non-aviator contemporaries. However, it brings a coincidental problem. In FY 70 we will have 4,000 aviators in nonflying jobs. How do we keep them combat ready? Let's compound the problem further by reminding ourselves that the Department of Defense plans to allocate only a relatively small number of aircraft for proficiency flying. In fact, there just won't be enough proficiency aircraft to go around. So, what is the solution?

In any solution presented there will be as many opinions as there are aviators. This article does not attempt to sell a solution, but examines three of the more obvious courses of action. Our objective is simple: We want you to talk about it, cuss it, praise it, shout and wave your hands, but above all, get involved. It's your flight pay and your career with which we're dealing.

The Department of Defense already has a policy of flight excusal status/refresher flight training for aviators outside operational flying positions. The Air Force and the Navy have been taking advantage of this policy for some years, with a considerable savings in time and manpower. The Army can adopt a similar flight excusal status program, but up to this time it has not been feasible. However, the conditions that require a high state of combat readiness are common to all services; namely, the ability to "conduct prompt and sustained combat incident to operations on land." How can we accomplish this in view of the numbers of people and aircraft involved? Let's examine three alternatives:

- A program similar to the current proficiency flying program as outlined in AR 95-32.
- A program of flying excusal when in an assignment outside of operational aviation units, with refresher flight training as necessary prior to returning to operational flying.
- A proficiency flying program which would be a combination of the above programs.

Let me hasten to add that all of these alternatives include retention of flight pay. (At this point please cover fangs, retract claws and cease to emit threatening sounds). Let's examine each of these choices.

First, a program similar to AR 95-32. It will, obviously, have the same advantages and disadvantages of the present system. However, upon examination the disadvantages appear to outweigh the advantages. The 80 to 100 hours required annually by 95-32 have produced an "acceptable" level of proficiency but the normal practice is to augment this with some type of refresher training at unit level prior to assuming duties as pilot-in-command. The present system also attempts to maintain an acceptable level of academic skill by the administration of the annual written examination.

AR 95-32 also states that "combat readiness requirements will normally be met during duty hours." On the surface this seems to be a reasonable and logical program, but any aviator who has served in a non-flying (Category B) assignment has very probably experienced some resistance to this statement. Many commanders are reluctant to release an officer during duty hours for the purpose of maintaining combat readiness flying skills (and with a good deal of justification). This places the aviator in an awkward situation. He must either remind his commander of the provisions of AR 95-32, thereby creating a conflict situation, or say nothing and do his flying on nights and weekends. This not only increases the possibility of accidents due to fatigue but also degrades the level of proficiency ob-

Soon there will be about 4,000 aviators in nonflying jobs. How do we keep them combat ready?

tained under such conditions.

Another related factor is individual motivation and incentive. An aviator placed in a non-flying position necessarily becomes involved in learning the intricacies of a new and sometimes unfamiliar job, thus flying may become an additional unwanted burden. This often results in "hole boring" rather than constructive training and tends to degrade the purpose of the proficiency flying program.

Second, consider a flight excusal status/refresher flight training program. This solution has several distinct advantages with the monetary angle being prime in this case. Current Department of the Army estimates are that in excess of 4,000 aviators were to be in non-flying assignments by FY 70. The annual cost for these 4,000 aviators to fly their 48 hours per year (*minimum* time required by AR 95-32) is over $1 million. Another distinct advantage is the savings in manhours of duty time expended in the accomplishment of combat readiness flying. This is time that can be more productively utilized in the officer's primary assignment.

There are several approaches as to who should be excused from the annual combat readiness training (CRT) requirements. The Navy and the Air Force use a combination of rank, age and number of years rated service as criteria for automatic flight excusal status. Although the Air Force and Navy programs are not completely applicable to Army aviation, their basic purpose is valid. It is doubtful if the Army will accept either the Air Force or Navy criteria since the Master Army aviator contingent is extremely small. This number of personnel in an excusal status would have little effect on the problem.

Any feasible excusal program must be broad enough to encompass a significant number of personnel. The more logical approach would be excusal based upon the demands of the duty position, the rank of the individual and the level of experience of the aviator. Specific criteria would be a judgment factor. This judgment could be accomplished by an administrative board convened at an appropriate level to examine individual cases which do not meet the 15-year experience criterion. At the 15-year experience level, excusal should be automatic.

There are two solutions to the refresher training part of this alternative:

• A formal program conducted at either the Army Aviation School, at zone of interior Army commands or at a major overseas command level.

• A less formal program conducted at installation/organization level.

Regardless of the type or location, any refresher program should consist of approximately 25 flying hours (with completion on a proficiency basis), appropriate classroom instruction and should terminate with a current instrument rating and successful completion of the annual written examination. This training should be in the type aircraft that the aviator will be flying in his new assignment. Based on the available cost-per-flying-hour for first line Army aircraft, the estimated cost of a formal program will probably result in a sizable annual savings when compared to the cost of the present CRT program.

With an estimated 4,000 aviators per year in nonflying positions, and a total Army aviation force of over 22,000 pilots, it is obvious that Jack's magic beanstalk has outgrown the garden.

That's the problem. Now it's up to you. Ideas are needed and some original thinking could mean dollars in your pocket and a service to the Army. Let's talk about it, argue about it—whatever is required—but, above all, let's keep the beanstalk healthy and growing.

The beanstalk has outgrown the garden, but any pruning must be done carefully to ensure its health

VIEWS FROM READERS

Continued from page 1

shown a constant improvement and is one of which the entire aviation community can indeed be proud. The 21.2 rate in FY 69 is more than a 20 percent reduction from the preceding year. I feel certain that the brigade's emphasis on aviation safety will result in still further reductions in aircraft accidents.

COL Hamilton's facts are also incorrect insofar as the 1st Aviation Brigade is concerned in reference to his statement that aircraft accidents account for more fatalities of flight crewmembers than combat action. During FY 69 the total crewmember fatality ratio in the 1st Aviation Brigade was one aircraft accident fatality compared to 1.4 air combat fatalities.

I believe that the article did much to point out the serious problem of aviation safety in the U.S. Army but its efficacy was hampered by faulty data concerning the record of the professionally managed 1st Aviation Brigade.

★ ★ ★

I guess it happens to most of us at times. While thinking of one thing, along comes something else that fits right into our thoughts and moods. While thinking of the aviation words and phrases we would like to have, we received a letter that reminded us of a play on words that once made the rounds of our desks. The letter is from CW2 John D. Jones, Assistant Aviation Safety Officer, 17th Aviation Group. His letter reminded us of the ditty—

"Appreciated be they who abideth by these words: It is not enough that wisdom be set before us, it must be made use of, for broad is the way that leadeth to destruction."

In his letter, CW2 Jones refers to an article we ran in the July issue. Here is what he had to say—

Sir:

The article in the July AVIATION DIGEST "Chinooks IFR (Cav Style)" by CW2 Carl L. Hess and CW2 George Combs was a very interesting write-up from several points of view. First, many instrument rated "Hook" pilots have been concerned about the possible loss of SAS (stability augmentation system) during instrument conditions. Experience of such losses under VFR conditions are few and far between. Secondly, fuel consumption has been another major concern. The CH-47A has a one hour and 30 minute flight time (considering 45 minute fuel reserve required by AR 95-2) which does not leave much time to destination and alternate (if required). Apparently this was not of much concern in this operation because of the keen coordination and communications from departure point to aircraft to approach point. Third, and most important, the pilot and copilot were both "tactical ticket" rated. Almost any instrument rated pilot or instrument examiner would agree that it isn't the ticket an aviator holds, but the ability to fly in instrument conditions that proves whether or not the flight should be attempted. The latest AR 95-63 allows tactical ticket holders to fly and log copilot weather time anywhere in the world (as an instrument examiner myself, I welcome this change).

We now have the experience and the opportunity, by regulation, to further train these men in the field and turn them into valuable assets. They can be upgraded to standard ticket holders with little difficulty in areas where VOR and ILS facilities are available. I say let's do away with the old "hearsay" that they haven't had enough training to be trusted in the grey. As a past tactical instrument instructor at Ft. Rucker, Ala., I say that we are graduating aviators today that are more highly trained than ever before and that we must conscientiously continue to train them once they arrive in the field.

Flight school has laid the basic ground work; it is up to the "old soldiers" to take them, salt them down a little with experience and continue their training until they have a polished product who can help train others.

It is apparent that the 1st Cavalry Division took great care in coordination and supervision which are the two most essential elements in any untried operation whether necessitated by a tactical situation or someone's ingenuity. Congratulations are in order for a job well done by all.

★ ★ ★

Two courses are being offered at Ft. Rucker to train men for the new OH-58 Kiowa. One is the OH-58 Mechanics Course and is for enlisted men. A new class starts each week and lasts for 5½ weeks. Seventeen men are in each class.

The other course is the OH-58 Instructor Pilot Transition-Gunnery Qualification Course. Ten officers are enrolled in each class and a new class starts each month. This course also lasts for 5½ weeks.

★ ★ ★

It is well for Army pilots to remember that we are not the only Army using helicopters. Perhaps the day will never come when helicopters engage in dog fights à la World War I. But when operating in conjunction with or against a sophisticated army also employing helicopters, our tactics and techniques could be changed. For this reason we should take note of the helicopters being used or developed by other countries.

Great Britain and France have joined hands in developing three new helicopters. One of their newest is the WG-13 which can be used as a combat helicopter or medium transport. Another is the SA 341 which is a light observation helicopter. This helicopter is unique in that it has a shrouded tail rotor designed to reduce tail rotor damage when flying a few feet from the ground. The third helicopter is the SA 330, a medium helicopter. This helicopter is said to be of medium design and is already in production.

Communist China has purchased 15 Alouette III helicopters from France. France produces both a civilian and military version of this helicopter. It is not known what version China bought. The military version of the aircraft can carry six fully equipped troops or can be used as an assault helicopter.

The Editors

Tactical Instrument Ticket Pays Dividend

". . . we were in a steep left diving turn. As I attempted to level the ship I realized the AC was still on the controls, resisting my control movements. He shouted 'vertigo' several times and I began adding power to try to stop our descent."

Lieutenant Gregory J. Dadak

I ARRIVED in the Republic of Vietnam just after the rainy season. My first month in country gave every indication that I would enjoy the most perfect flying weather I'd ever known in my short career as an Army aviator. It was total VFR flying and I didn't give the slightest thought to my past tactical instrument training at Ft. Rucker, Ala.

The importance of the program had not occurred to me at the time and all I could remember now of my instructor's labors was the admonition to never go IFR intentionally. But, this was about to change.

On one particular occasion I was assigned to a night flight as copilot. We were to depart our landing zone (LZ) on the Bong Son Plain, drop passengers at Qui Nhon and return. Takeoff was planned for 2200 hours and it was an estimated 45 minutes enroute. The destination and route were well known by the aircraft commander (AC) and our flight planning consisted of a look at the sky around 2100 hours. The night was CAVU—exceptionally clear, not a cloud in sight, just a blanket of stars. We quickly assumed we were going to have a routine night flight and began to preflight the UH-1.

Twenty minutes before our departure time the AC appeared with our passengers. A comment was made about the clear sky and we strapped in expecting to be back about midnight. As we lifted off the 2,800 feet high Nui Mu Mountains to the south were clearly outlined against the sky. The AC climbed out to 4,000 feet to insure clearance enroute. As we proceeded southbound through the pass I took control of the aircraft and the AC directed me to proceed via the coast.

As we turned toward the coastline the Phu Cat mountain range further south was not clearly visible. The AC mumbled something about night visibility and took the controls to begin a letdown. About this time the weather definitely began to deteriorate and our letdown was increased to maintain ground contact. By the time we reached the coastline we were experiencing light rainshowers and losing altitude at 1,500 feet per minute! I was happy to have an experienced AC, but I did become concerned when we passed through 200 feet indicated with our only outside reference being the ocean beneath us. At this time the AC elected to execute a 180-degree turn and climb back up. We were going toward land and being familiar with the mountains, which were on the coast, I had some nervous moments before we completed our climbing turn back to clear skies.

The AC elected to try the land route and again I put my confidence in his experience as we climbed to 3,000 feet (second mistake).

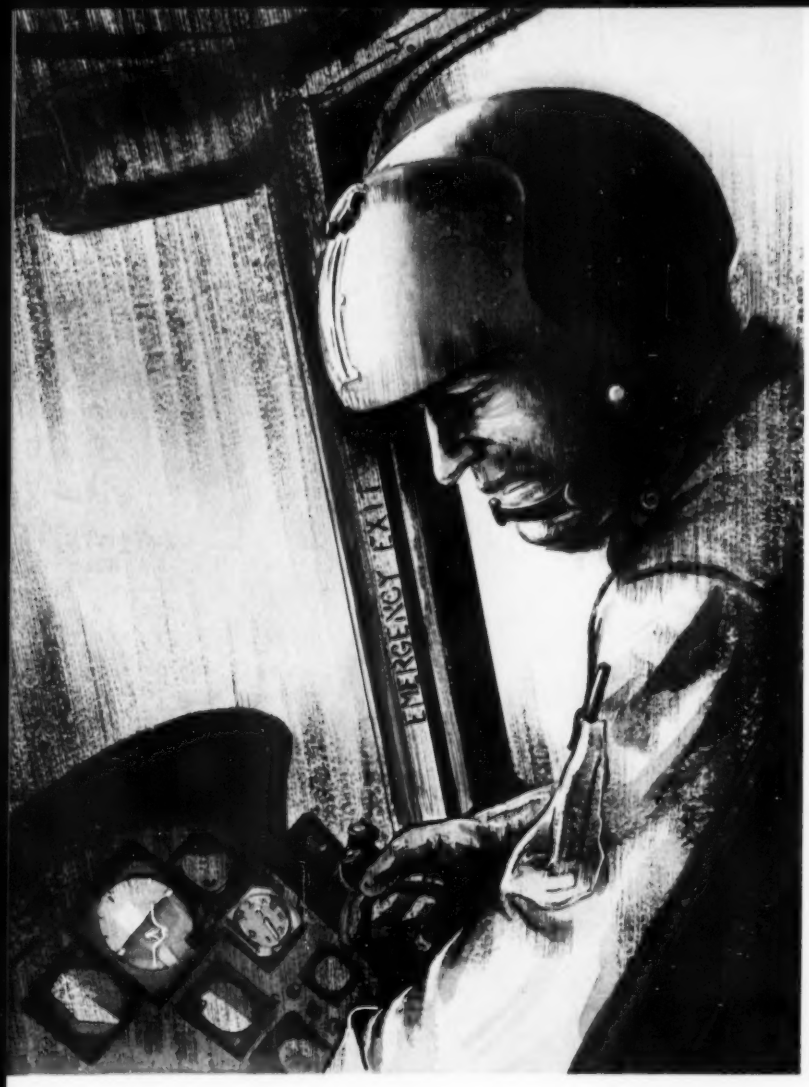
The next 20 miles seemed as though this was the route we should have flown in the first place. Then we noticed that no lights were visible from the Phu Cat Air Force Base, which marked our halfway point, and we began to encounter a slight scattered condition. I thought maybe we should tune in their radio beacon, but before I could find the frequency we went completely IFR.

This was my first time in the clouds and I was glad I wasn't flying—though only for a moment. The AC announced that he was getting out of this stuff and snapped the aircraft into a hard left turn. Then he shouted, "I have vertigo, take the controls, take the controls!"

I came on the controls in near panic, glared at the instruments and heard a faint voice from the past saying, "Level the wings, stop the altimeter."

We were in a steep left diving turn. As I attempted to level the wings I realized the AC was still on the controls, resisting my control movements. He shouted "vertigo" several times and I began adding power to try to stop our descent.

The ship was nearly level but we were still nose low. As I attempted to ease the nose back up the AC asked if I had the ground in sight. I looked up but could see nothing. By the time I could get back on the instruments we were in a steep turn



again. As we fought over the controls I began looking for the ground myself in hope of becoming VFR again. Finally we broke out into a scattered condition which provided enough reference to fly VFR. I never did look at the altimeter but I could easily distinguish trees at the altitude at which we recovered.

The AC then returned to home base since the weather was definitely not VFR at our destination.

In a short but nearly fatal time my tactical ticket became the most important part of my existence. Everything I had been taught about instrument flying had been proven that night.

Before takeoff we should have checked the weather. We had no weather station of any kind at our LZ, but considering the time we had before the flight we could easily have used a land line to check weather at our destination.

Since it was a night flight in mountainous country we should have been prepared by being familiar with, and capable of employing, all available navigational aids. At takeoff we could have contacted area radar, and during the flight we could have had enroute radar assistance and advisory reports plus available radio beacons.

After our first encounter with IFR conditions we still did not make use of available navigational facilities. The Air Force base at the halfway point could have easily made radar contact with us well before we went IFR and could have advised us of the weather in their area which would have prevented the ensuing incident.

Even after all the improper planning the flight could still have been routine if we had used our prior instrument training. In a combat area there is always the possibility of inadvertent IFR on certain missions.

A 180-degree turn is probably one of the easiest maneuvers taught in basic instruments but you must be on instruments for proper execution, obviously. The AC made one basic mistake—he attempted to turn VFR while IFR—and I almost made the same mistake.

Then there is aircraft control. In too many instances fatal accidents are a result of two pilots attempting to fly the aircraft at the same time.

In reviewing this mission it is evident that nearly every basic rule of attitude instrument flying was disregarded, yet it evolved into a hard lesson learned rather than a fatal accident. My instrument course at Ft. Rucker had never been forgotten. The teachings were applied to their fullest extent from that night on, and it prevented identical occurrences on numerous occasions to follow during my tour in Vietnam.

FOOTNOTE: Aviators who have experienced similar occurrences are requested to forward a brief synopsis of the event to the Director, U. S. Army Board for Aviation Accident Research, ATTN: BAAR-ED-O, Ft. Rucker, Ala. 36360.—The Editors

"Grounded" Eagle

An accident investigation as seen through the eyes of the junior board member

Lieutenant Colonel C. C. Norton

THE SHORT TRANSITION from "feet up on desk thumbing through aviation safety literature" to being kneedeep in a snake-infested swamp or clawing a path up the side of a mountain is a way of life for members of aircraft accident investigation boards. There are many times when the task is a bit unpleasant but it is almost always engrossing. Having an occupation whose reason for being depends on someone else's misfortune is a thankless role. It is, nevertheless, an important function. Hopefully, accidents have been prevented through the detection and correction of deficiencies mechanical, individual or super-

visory that contribute to an investigated accident.

One interesting aspect of the position is watching the transition that occurs in many newly appointed members of an accident board. The initial reaction upon being advised of their assignment as a board member is usually along the line of, "Why me?" The second thought is the conviction that they were just in the wrong spot at the wrong time and that all they will contribute is the signing of one of the required signature blocks of the finished report. The development from this attitude to that of becoming an active, interested, participating member of the board is almost inevitable.

To illustrate the transition let's follow a typical case. A young pilot just returning from Southeast Asia has been advised that he is going to be an instructor pilot—a returning eagle selected to impart his knowledge to the fledglings. Just what he has always wanted!

The first blow comes when he is advised there is a lot more to instructing than being able to fly the aircraft from the wrong side. First, there is a formal MOI course that must be completed. Our hero finds himself dumped from the position of *teaching eagle* to that of *learning pilot*. After a month or so of this routine our pilot is again approaching the threshold of becoming a teacher of birdmen.

Fate chooses this moment to again point the finger. An accident has occurred and a call has been received that temporary duty with the accident board is required. Who is more readily available than our just qualified hero? He has been assigned no students. None of the other instructors are sick; so he is assigned the duty. Off he goes to take up temporary residence with the board.

Instructions received were to get to base operations ASAP; let somebody know who he is and that he is to be delivered to the scene of the crash by the most expeditious means. Being a doer, if not a believer, our beginning investigator soon finds himself pressing forward valiantly through brush and brambles that would daunt a moose, looking for someone who can tell him what he should be doing.

It looked like midair disintegration

For a long time all members of accident boards were selected more on their availability than on their capability or training in this particular field of endeavor. This situation has been changing as more graduates of the Aviation Safety Officers Course (conducted at USC, Los Angeles) have become available. On most Army posts now at least one USC graduate is serving in the capacity of permanent accident board member. When possible, attempts are made to have newly appointed members attend some kind of short course in accident investigation. When this can be accomplished two purposes are served. It gives the new investigator at least an idea of what the approach to investigation is and generally what he can expect to be doing.

As this particular story unfolds our "drafted eagle" soon finds his way into a mass of brush from the middle of which wisps of smoke are rising. As he reaches the source of the smoke, he experiences a sinking feeling. There are a couple of pieces of metal, mounds of smoking dirt (what use to be a tail boom), and some people standing around holding clip boards. Right then he knew that either this was going to be one of those "pilot error" deals and would be finished in a week, or else it would go on for months with the goal being to avoid saying, "We don't know." Just his darned luck!

Our hero, let's start calling him Lieutenant Arnold Sleuthshoe, located the highest ranking individual he could find, introduced himself and learned that he had just met the president of the board, Lieutenant Colonel Knowsit.

Two other board members were there, one of them the flight surgeon, the other a senior board member. Arnold is briefed by the president, but the available facts are rather scant. There had been two persons on board and both were deceased. The aircraft was based at the main post, and it was believed that it was being flown by "X" Flight Training Division. The crash site was near a flight corridor used by both the "X" and the "B" flights enroute to their respective training areas. A couple of civilians had volunteered that they had seen the aircraft just before it hit. There didn't seem to be much to work with.

The president announced that he was going to talk with the known witnesses and released the flight surgeon to return to the hospital. Arnold was to meet the various technical representatives when they arrived and record what they had to contribute. Arrangements had been made to have a maintenance officer assigned to the board; who, together with a technical inspector, was expected to arrive on the scene shortly. The other board member was to work the photographer.

As the shadows lengthened, it became apparent to Arnold that either: a. The fire had burned up an awful lot of parts; b. There was a lot of helicopter buried under the still smouldering mounds of dirt; or c. A lot of the helicopter had never arrived at the crash site. His conviction that there wasn't going

to be much learned about this accident deepened.

That evening the board members gathered. Arnold and the maintenance officer had a list of major parts that didn't seem to be readily available. They hadn't found any part of the main rotor, rotor head, transmission or tail rotor. Available witness statements indicated that a lot of pieces had been seen flying off before impact occurred. Midair disintegration appeared likely. Arrangements were made for a helicopter for the following day and everyone was directed to report to the accident investigation office at 0630 hours the next day.

At the appointed time the board members were all present. In addition to the official members there were several factory technical representatives present, and the maintenance technical inspector arrived carrying about a 3-foot stack of manuals.

It was quickly agreed upon that the first thing to do was to verify what parts were missing. To facilitate this the maintenance member of the board, Captain Technicus; the technical inspector; Arnold; and the airframe and power plant technical representatives would proceed directly to the crash site by helicopter. The president was going to drive to the residence of the witnesses to get statements from them, using a tape recorder. The remaining board member was to remain on post and start collecting the administrative records needed: aircraft records, pilots' flight records, weather report, aircraft dispatch form, etc. The investigation was underway.

When Arnold arrived at the crash site, the first thing he noted was that the piles of dirt had stopped smoking. Having been directed to record exactly where everything was found, Arnold had armed himself with a clip board and several sheets of graph paper, a compass and a tape measure.

For hours the slow business of sifting through the ashes progressed. It was surprising how many items of technical value could be found in what had appeared to be nothing but ashes. The transmission was located buried upside down in the ground. The mast was broken and there was no trace of the rotor head. Blackened lumps of metal were unearthed and quickly identified by the experts as servos, dampeners, rod-ends and hydraulic pumps. It was a respectable list of parts.

It was apparent that several important pieces of the wreckage were missing. Arnold may not have known why they came off but he knew he could identify them if he saw them

At midmorning the president arrived and was given an accounting of what had been located and identified and, of equal importance, what hadn't been found. It was now apparent that no part of the main rotor was in the immediate vicinity of the crash site. The tail rotor was also missing, as was the whole vertical fin and at least a couple of feet of the rear end of the tail pylon.

The fact that these pieces were needed was evident. Arnold may not have known why they came off but he knew he could identify them if he met them in the woods. He volunteered to lead the search party looking for them.

He quickly became aware that he had volunteered for an assignment which would have been given to him anyway, and that there was going to be a lot more to it than he had thought. To begin with, when asked where he was proposing to look, he realized that he hadn't thought about that.

A review of the witness statements indicated that the aircraft had been flying in a generally easterly heading. That placed the logical area to be searched to the west of the crash site. Further analysis of the witness statements indicated that some "pieces of paper and what looked like planks" had been seen falling in an area about 200 yards away. That appeared to be the place to begin.

By early afternoon a search party of 30 men had arrived on the scene. Arnold was eager to get the search underway but the president had a method of his own. First he gathered the men together near the helicopter that the board members had used to reach the scene. He pointed out to them the specific parts of the helicopter that were missing. An additional few minutes were spent explaining why it was important that those pieces be found. The president then reminded the men that the area they were going into probably housed snakes. That brought some startled looks to a few faces. The president quickly sketched out the procedures to be used to prevent snake bite, namely paying close attention to where you were going. Then he told them what to do if they were bitten.

One thing about it, Arnold thought, if they really keep an eye open for snakes they'll be sure to see any pieces of helicopter that they might come upon.

Two days later Arnold's search party had accumulated the entire main rotor system, the tail rotor system, a few pieces of the 42-degree gear box and about two bushel baskets full of assorted small pieces. As individuals, the members of the search party had accrued innumerable blisters and had collectively shed about a gallon of blood as the result of continuing encounters with a particularly vicious breed of thorn bush.

Two members of the party had acquired a certain lingering distinction as the result of a chance encounter with a skunk. Snakes had been met, but because of the initial warning and the resulting caution that had been practiced, the snakes had come out losers. Several of the men had collected rattles as evidence of their fearlessness. The big thing was that the missing parts had been located. Now the analysis of the accident could begin.

By now Arnold had become an interested member of the accident board. He found himself literally surrounded by pieces of an aircraft that for some reason had stopped acting like an aircraft should. The people he found himself associating with could look at a piece, or a part, and in many cases tell whether or not it had been doing its job correctly. It was like a massive jigsaw puzzle.

A portion of a hangar had been designated for use by the accident board. Initially, the recovered pieces of the aircraft had just been hauled in from the field and unloaded in the corner. In all accident cases, there is always the hope that an obvious cause of the disaster will leap out of the wreckage. In too few cases does this happen, but hope springeth eternal. To this end the more critical components received the initial attention: was the engine running, were all the various controls attached the way they should have been, did a major item fall off for some reason?

It was this phase of the wreckage analysis that began to take a grip on Arnold's imagination. Hour after hour he watched while the experts sorted through the charred pieces, discarding most of them, but exultantly clutching to their bosom an occasional chunk. Slowly there emerged in the corner of the hangar a pathetic resemblance to a helicopter. Pieces of cabin flooring were positioned between the remnants of the skids. The transmission was braced in an upright position. What was left of the tail pylon (now being properly referred to as the "aft assembly") was stretched out on the floor. The recovered vertical fin and attached tail rotor were in their approximate

Arnold knew the investigation was over his head and when he found himself up to his knees in snake-infested swamp, aircraft accident prevention really began to have meaning

proper position. Through it all were the recovered pieces of various control tubes, cables and bell cranks.

As the pieces were gradually transitioned from unrecognizable chunks of debris to distorted but identifiable parts and components, Arnold realized that even he could see a thread of a pattern beginning to develop.

This piece was obviously struck by one of the main rotor blades. That meant that either the main rotor blade wasn't where it was supposed to be or the piece that was struck wasn't where it should have been. More sifting, more matching of broken ends and suddenly it was apparent that the piece in question couldn't have been where it should have been. Here was a fact; to determine what significance it held meant hours of studying parts and more hours spent thumbing through technical manuals. The maintenance representative spent two days studying in detail every scrap of maintenance records available.

A shipment of parts was made to a special analysis laboratory, together with a request that certain sealed components be taken apart and the pieces inside analyzed. Three days later a telephone call was received requesting that additional parts be shipped.

By now attention was centered on two primary suspect areas. Arnold had his mind made up that one of the areas was the villain; the maintenance representative was certain it was the other area. The flight surgeon maintained a neutral position, and the two other members wouldn't commit themselves either way.

Another week passed. The activity had now been reduced to pencil pushing. The president was writing the draft of the lengthy narrative that was required. The board secretary was busy converting miles of recording tape into readable witness statements. The photographs needed editing and captioning. Arnold, being the junior member, was busily assembling all the things that constitute a proper report. There were certain covers, certain dividers, certain enclosures; all of which were to be assembled in a certain order. Fortunately he received a lot of guidance from the president, and he also had the appropriate regulation available.

As the pieces were gradually transitioned from unrecognizable chunks of debris to identifiable parts, Arnold realized that even he could see a thread of a pattern developing

Twenty-four days after the crash occurred a lengthy phone call was received from the analysis facility. They had some factual evidence indicating that one of the two suspected areas was, in fact, the cause of the accident. The initial failure had resulted almost immediately in a secondary failure in the other suspected area. The maintenance officer had been correct. Actually the president had been even more correct in that he had not discarded the possibility of either point being the initial area of failure. Urgent messages were dispatched to distant addresses stating what had been determined as having been the cause of the accident. A day later a priority TWX was received directing that certain inspections be accomplished on the type aircraft involved in the accident prior to any further flying. Arnold had the rewarding feeling that perhaps another accident for the same reason had been prevented.

Three more days of administrative activity passed. The draft was edited, re-written and then re-edited. Eventually everyone concerned with the construction of the report was satisfied that the pertinent facts were all there. Then the board's recording secretary took over and began typing it on the appropriate forms and in the proper number of copies.

Arnold received another little surprise. Experts who had been able to produce so many meaningful facts out of ashes were something less than experts when it came to telling the difference between singular and plural nouns and past and present tenses. Each to his own. The secretary was advised to do what had to be done to get it past the grammar experts, but to be sure to leave the meaning of everything unchanged.

That afternoon, just as Arnold had begun to thumb through an old copy of the AVIATION DIGEST, the crash phone rang. A plane was down, nobody hurt, but the plane appeared to be pretty badly bent. It appeared certain that the safety division would determine that it was a major accident.

Calls went out to alert the various flight divisions that temporary members would be needed for an accident investigation. Arnold suddenly felt left out. There was more to this business than just signing a signature block. He wondered what the possibility might be of a quota to that Aviation Safety Officers Course out at USC. . . .

NIGHTHAWK

Firefly, Flashlight, Night Hunter and now Nighthawk have been making the nights unhealthy for Charlie

Captain Garrett C. Marcinkowski and CW2 Steven J. Zorger

CAREFULLY, the camouflaged cover for the tunnel is moved aside. Into the dank wetness of the hole comes the aromatic scent of the lush Vietnamese night filling the grateful lungs of Nguyen Van Ti.

Nguyen and his squad had been in the tunnel all day afraid to move because of the enemy helicopters and troops in the area. But now the protective mantle of night had fallen and the squad could again move undetected with its precious rockets for the impending attack on the Yankee base camp. He must not fail in his mission. The target is the headquarters, the nerve center of the American camp.

In single file the men leave the tunnel, stepping carefully to avoid the many booby traps placed to protect their lair. "Good," thinks Nguyen, "the moon is only one quarter. It is enough for us to see but still offers the protection of near darkness."

No sound is heard from the men as they toil their way through the dense underbush with their bulky and heavy loads. For two hours they march and—

"Hold! That noise? It is an accursed helicopter. Don't move!"

Nguyen searches the black sky, but can see nothing. "It is near, I know, but perhaps it is the strange things that sound does on a quiet night. There is no sign of the machine." Nguyen signals to his men. "Quickly, we have but 30 minutes before we must be in position."

The men rise, nervously [illegible] for an unseen noise in a star-studded [illegible]. Taking up the [illegible] they move along the [illegible] single file. "Perhaps it is only an emergency [illegible] from one point to another. The Americans [illegible] at night only when the need arises.

"Aahh! That light! What is it? I am blinded. What can I do?" A fierce glare envelopes the men, frightening them into a frozen stance much like deer. They do not stand long because they are taken under fire with a weapon which shoots at amazing speed and with deadly accuracy.

Nguyen sees his men crumple like puppets which

Nighthawk

have lost their strings. A round finds a rocket and with a terrifying roar half his men disintegrate before his eyes. Suddenly, he is hit in the back and as he begins his fall in a world quickly turning hazy and red he wonders, "What is this? How did they know we were here? What terrible weapons do they have?"

Nguyen will never know, nor will his men. They lie on the trail somewhere in the jungle northwest of Saigon. Their rockets will never be fired.

In the air, the helicopter pilot speaks into his radio, "Sighted 10 men with rockets and weapons on trail near XT473485. Engaged with minigun and automatic weapons. Results, 10 body count, one secondary explosion. Continuing mission, over."

* * *

Fiction you say! No, it is the truth and is happening with astonishing frequency in the 25th Infantry Division's area of operations. Flying all night in a specially outfitted helicopter, the "Centaurs" of Troop D (Air), 3rd Squadron, 4th Cavalry, have compiled an outstanding record of enemy body count and enemy equipment destroyed, all without loss to themselves.

The xenon searchlight and night observation device

Currently, in the 25th Inf Div six Nighthawk aircraft prowl the skies in specific areas. In this manner a large area can be covered during the hours of darkness. Both the 25th Avn Bn and Trp D (Air), 3rd Sqdn, 4th Cav, take primary responsibility for this mission.

The "Nighthawk" is becoming a fixture during the hours of darkness in the division area. It is a UH-1H lift helicopter fitted with special equipment to give it a unique capability of seeing without being seen.

In the left rear doorgunner's well, a xenon searchlight and a night observation device are mounted coaxially with the xenon light acting as the light source for the device. The searchlight has two modes of operation, infrared (IR) and "white" light. When the searchlight is operated in the IR mode, the operator can observe objects on the ground using a night observation device without giving his position away. In addition, the infrared beam increases the range of the infrared device, allowing the aircraft to stay above 1,000 feet.

When a target is acquired, the light operator notifies the doorgunner positioned behind the left pilot's seat. The gunner is equipped with a minigun mounted on a locally manufactured mount. The minigun uses an LOH brainbox and fires at a rate of 1,500 rounds per minute. This rate of fire is more than sufficient and the operator does not have the increased problem of control when firing at a rate of 4,000 rounds per minute.

Close coordination between the light operator and doorgunner is essential. It must be remembered that when the light is operated using the IR mode, the doorgunner cannot see any target. The light operator must give a clock azimuth and approximate distance of the target to the man on the minigun, i.e., four North Vietnamese at 10 o'clock and 400 meters (12 o'clock is the nose of the aircraft).

The aircraft commander then will brief other elements of his team if applicable. (These elements will be discussed in greater detail in later paragraphs.) The light man will give a three second countdown to the other members of the crew and switch the light from the IR mode to white and the target is immediately engaged with devastating accuracy.

On the right side of the aircraft two gunners armed with M-60 machineguns give protection to the aircraft if fired upon. They have no means of detecting targets other than visual. Between the light operator and minigun operator, another gunner with a free M-60 offers additional firepower to insure complete coverage of the acquired target. Usually 8,000 to 10,000 rounds of 7.62 ammunition are carried on each mission. By the end of the night most of it is gone.

One can readily see that crew coordination is of prime importance. To this end, one crew is permanently assigned to fly the Nighthawk aircraft. Although these men cannot participate in missions the next day, the aircraft can be reconverted to a liftship in less than 30 minutes. The recon capability of the air cav troop is thus increased with no appreciable reduction in mission readiness.

The Nighthawk's mission is simple: find and destroy the enemy. Because of its simplicity, its employment can be varied considerably to fit the area or type target expected.

Normally the aircraft is employed as a single ship; this allows it to roam freely. The firepower of its door-mounted guns gives it the capability of engaging almost any target against which a gunship can be employed. The aircraft is flown at an altitude between 1,000 and 1,300 feet and is completely blacked out. However, being blacked out does not make it a wraith in the sky to other aircraft. The ship is on radar and has sufficient warning from ground controllers of nearby or approaching aircraft so that it can take evasive action. Therefore, Charlie can hear the aircraft but cannot see it. The element of surprise is increased and the possibility of ground fire greatly reduced. In 45 days of operation, Centaur Nighthawk ships have taken only one hit.

Should the area be considered "hot," a gunship may accompany the Nighthawk to offer added protection or to engage large targets with rockets. In this case the gunship flies blacked out and the slick uses only his anti-collision light. It has been found that gunship coverage does not increase the kill ratio to any appreciable extent. Gun teams of the 3/4 Cav are kept on a five minute standby and can be scrambled to any location on short notice. Artillery and air strikes are also included in the pilot's bag of tricks.

The Nighthawk can be given the mission of roaming an assigned area with the express purpose of engaging enemy forces whenever they may be found. The aircraft also can be tasked to support specific ground units in night laager positions or fire support bases. In either case, prior coordination with the ground troops is necessary.

In the first instance the area will generally be a known enemy stronghold where no friendly forces are situated. The mission commander must learn his assigned area of operations and where the closest friendly forces (if any) are located. Naturally all necessary frequencies will be known before departure. It is desirable that he also obtain permission to engage targets of opportunity prior to taking off on the mission. This makes his job easier and will insure greater body count.

The minigun (rear), the searchlight and the night observation device constitute deadly night weapons

When supporting a specific ground unit, a more detailed briefing on locations of ambush patrols, listening posts, etc., is mandatory. In fact, an observer from the supported ground unit may be included in the crew to identify locations or give permission to fire.

Support has been given to numerous fire support bases and night laager positions in this manner and has proven to be extremely effective. In one night's operation in support of a fire support base near Cambodia, the Nighthawk ship killed 22 enemy troops who had been in trees or approaching the friendly position's perimeter.

In every case one must consider the psychological effect of such an aircraft. The night used to belong to Charlie. In the past he has moved and attacked with near impunity between sunset and sunrise. With the Nighthawks, he must think twice about moving large groups any distance at all. Each time a helicopter is heard his movement must cease. He cannot take the chance of it being just another aircraft. He must assume it has the capability to see him.

Consider also the friendly psychological effect on a supported unit. A ground trooper is likely to breathe a little easier with such an aircraft overhead.

Because of the aircraft and mission flexibility, various aircraft can be added to the mission to give it a special flair. The variations are limited only by the ingenuity of the user.

A great deal of the night still belongs to the enemy. But the ingenuity of commanders and dedicated pilots on such operations as Firefly, Flashlight, Night Hunter and now Nighthawk have made serious inroads on the Viet Cong and North Vietnamese claims that "the dark is our cover." The future bodes ill for Sir Charles.

The Kiowa Joins Up

The OH-58 now is undergoing tests and by mid 1973 the Army should have over 2,000 of the aircraft in its inventory

Major Robert S. Fairweather

A NEW ENTRY to the light observation helicopter (LOH) field has arrived in the Army inventory and the fun and enthusiasm that marked the OH-23 versus OH-13 unit rivalry can now be applied to two newer contenders: the OH-6A Cayuse and the OH-58A Kiowa. The Cayuse, a proven champion with considerable combat experience, is now being joined by its promising and capable comrade—the Kiowa.

What can the Kiowa do? How does it compare with the Cayuse? What does the future hold in store for it? Indications are that the OH-58A will become a stalwart of the aviation team. Having proven itself in a series of preliminary matches, it has developed into a potential champion. Sleek and nimble looking, it draws only admiring glances from Army aviators who are fighting for a chance to grab the controls and see what it can do. Expected performance for the OH-58A parallels that of the OH-6A and this new helicopter should take on its assignments with great success.

A military version of the Bell JetRanger, the OH-58A will be used primarily for observation and scout missions. It can carry three people plus a crew of two. To enable it to speak with authority, the scout version can be armed with the M-27E-1 (7.62 minigun) armament kit and in this configuration tips the scales at 3,000 pounds. Acting in the observation

role the OH-58A weighs 2,867 pounds, has a range of 264 nautical miles and a speed of 120 knots. Powered by a 317 horsepower Allison T63-A-700 gas turbine engine, it is easy to start, a pleasure to fly and simple to maintain. A summary comparison of the two LOHs appears in the accompanying box.

By mid 1973 the Army should have over 2,000 Kiowa helicopters in its inventory of aircraft. The first delivery of the new LOH was made last June and since it has been coming off the assembly lines at the Bell Helicopter (Hurst, Tex.) plant in increasing numbers.

Although Bell is the prime contractor for the $123,000,000 contract, 70 percent of the production has been subcontracted to other manufacturers of aircraft and aircraft components. Beech Aircraft Corporation is supplying components to include fuselages, skid gears, tail booms, spars, stabilizers and rear fairing assemblies. Bell is handling final assembly, flight test and delivery of the helicopters.

Five OH-58s now are being tested at the U. S. Army Aviation Test Board, Ft. Rucker, Ala. Two are being service tested while the remainder are undergoing maintenance, reliability and availability testing.

The OH-58 also is being flown in a confirmatory test project which is using 26 aviators from the 8th Armored Squadron, 1st Air Cavalry at Ft. Knox, Ky. The OH-58s are operating in simulated Vietnam combat situations with one 7.62 mm minigun mounted on the left side of each aircraft. Eight OH-58s are involved in this project.

Other OH-58 tests include an armament capability test at Yuma Proving Ground, Ariz., and avionics testing at both Ft. Huachuca, Ariz., and Ft. Rucker. Desert and high altitude tests already have been completed.

The aviation school initially will receive 14 OH-58s for training. Seven of these will be used in the IP Transition/Gunnery Qualification Course and seven in the OH-58A Helicopter Repair Course. Ninety IPs are scheduled to be qualified in FY 70 with the first group becoming ready for field assignments in the second quarter of FY 70. Six hundred and seventy-two OH-58A repair course students will be awarded a 67V 2T MOS upon graduation in FY 70. The first trained Kiowa mechanics reported for assignment in September. The IP course runs five weeks and three days and includes 32½ hours of flight instruction. The repair course takes a little over five weeks and includes 181 hours of maintenance instruction.

NOTE: Following references used to write this article:

Browne, LTC Edward, "Kiowa Receipt Prompts LOH Progress Report," PLANE TALK, AVSCOM, 11 July 69.

Smith, William H. "OH-58A Kiowa," unpublished article for the U.S. ARMY AVIATION DIGEST, Aug 69.

LOH SUMMARY COMPARISON

	OH-6A[1]	OH-58A[2]
Overall length	30'4"	40'4"
Observation weight (lb)	2,412	2,867
Scout (armed) weight (lb)	2,545	2,970
Engine	T63-A5A	T63-A-700
Max power (hp)	270	317
Armament	M-27E-1	M-27E-1
Vne (knots)		
Observation	121	120
Scout	117	120
Rate of climb[3] (fps)		
Observation	1,550	1,590
Scout	1,400	1,470
Range[3] (nm)		
Observation	320	264
Scout	302	250

[1]From TM 55-1520-214-10
[2]From TM 55-1520-228-10
[3]Sea level

Charlie and Danny's Write-in

If you have any questions regarding the checklist (CL) or operators manual (dash 10) direct them to the Evaluation Division, Office of the Director of Instruction, ATTN: Charlie and Danny's Write-In, Ft. Rucker, Ala. 36360.

Dear Charlie: I realize that the Otter and Beaver are getting a bit old but they are still doing a lot of hauling. The only checklists I've seen for these aircraft are from Ft. Rucker and Ft. Ord. Why haven't we published CLs for these aircraft?

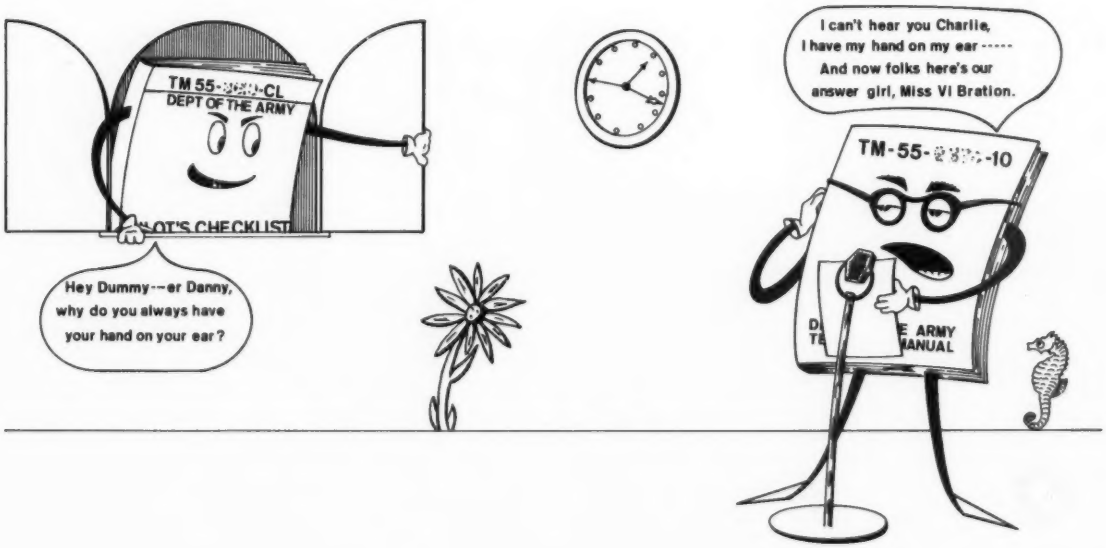
1LT R.C.S., 3rd Army

Charlie's answer: I'm glad you asked this question because it gives me a chance for a little publicity. The U-1 (Otter) checklist is being printed right now and should be in your hands this winter. The U-6 (Beaver) CL is being written and will be right behind the U-1. This would be a good time to check up on your publications requirements to insure that you will get yours under the pinpoint distribution system when they become available.

Dear Danny: It used to be that nobody tried to start a Huey with an APU unless it was 650 amps or more. In looking at the most recent UH-1B and D operators manuals, I do not see any restrictions on using APUs. What's the story?

CPT A.S.C., USAAVNS

Danny's answer: The word is—use at least a 650 amp APU for an external power start. This information will appear in future changes to the UH-1B and UH-1D/H manuals. The UH-1C dash 10 manual does contain instructions on use of an APU of at least 650 amps.


TM 55-[illegible]-CL
DEPT OF THE ARMY
[illegible]OT'S CHECKLIST
Hey Dummy--er Danny, why do you always have your hand on your ear?
I can't hear you Charlie, I have my hand on my ear -----
And now folks here's our answer girl, Miss VI Bration.
TM-55-[illegible]-10

Dear Danny: Reference the article in the July issue of the AVIATION DIGEST entitled "Do You Really Know the UH-1?" and AR 95-16, Weight and Balance—Army Aircraft. Question 21 of the article stated the UH-1 series of aircraft required no special loading preparation. The article stated that the heaviest items should be placed as far aft as possible in order that the cargo could be located nearer the helicopter center of gravity and allow the maximum cargo load to be transported as well as maintaining the helicopter within safe operating limits for flight. Now, my question. AR 95-16 defines Class 1 aircraft as "those aircraft whose weight and balance limits can be exceeded *sometimes* by actual loading arrangements." The UH-1 series is in this category. If no special loading preparation is required, as the article states, why does the dash 10 devote two entire chapters and numerous charts and diagrams specifically for this purpose?

CPT A.C.E., Hunter AAF

Danny's answer: First, let me say that your interest in the UH-1 Operators Manual is appreciated. Only through efforts like yours can we improve the dash 10 and CL. Now, why does the dash 10 devote two whole chapters and numerous charts and diagrams specifically for computing weight and balance? Regulation writers and aircraft manual publishers don't get together too often, I guess, so we have an aircraft (UH-1) that is by regulation Class 1 and by design a machine whose balance limits can be rather easily exceeded. When you and others like you suspect that your Huey is loaded in such a manner that center of gravity limits have been exceeded, then a DD Form 365F is required for that flight (reference paragraph 2d (1), AR 95-16). All the pertinent information is available to you in the dash 10 manual to assist you in filling out a weight and balance clearance form.

Dear Danny: I was told by a friend here in RVN that in his unit's U-21s they tie a string to the PROP GOV IDLE STOP circuit breaker and run it to the control wheel so that they can immediately pull it if the SECONDARY LOW PITCH STOP light on the annunciator panel lights up. Is this a good idea and if so why is it not in the dash 10?

CPT J.G.S., 1st Avn Bde

Danny's answer: Negative! This idea is neither recommended nor authorized. Pulling the PROP GOV IDLE STOP circuit breaker disarms the secondary idle stop system which protects against propeller reversing in the event of failure of the low pitch stop.

Change 1 to the March 1969 issue of the U-21 Operators Manual includes (in Chapter 4) the following procedure for SECONDARY IDLE STOP SYSTEM FAILURE: "The procedure to follow in the event of illumination of the SECONDARY LOW PITCH STOP light is: (1) Power level (affected engine)—IDLE; (2) Prop gov idle stop circuit breaker —pull; (3) Power levers—as desired. (Note: Propeller reversing when the PROP IDLE STOP circuit breaker is pulled indicates failure of the mechanically monitored hydraulic stop. In this event reset circuit breaker and secure the engine.)"

The following caution appears under TAKEOFF in Chapter 3: "Illumination of the SECONDARY LOW PITCH STOP light indicates failure of the system and the affected propeller pitch will move toward feather. If this occurs during the takeoff climb, reduce power as required to prevent exceeding torque limits."

THE TIGER'S ROAR

Most of the troops in the outpost had been killed or wounded . . . they needed our help

Captain William E. Walgren

0330: THE OPERATIONS building of the 121st Assault Helicopter Company was about to close when the piercing ring of the hot line phone broke the stillness of the night. "Tan Phu," said the voice on the other end of the line, "a small Popular Forces outpost in Chau Doc sector is under attack. Very serious. Get your Vikings on the way—heavy fire team ASAP! Land at Chi Lang to refuel and get a situation report."

0332: The blast of the alert horn split the heavy night air like the roar of a tiger. Two of the Viking gunships were untied and turning. The navigation lights on the "Hog" began to flash by the time the lead pilot, his flight suit still unzipped, ran from the operations shack. In his hand was an SOI and a brief mission sheet. He cursed quietly as he leaped the open sewer behind the line of gunships and tripped on his still untied bootlaces.

0335: The tower UHF crackled to life. "Soc Trang tower, Viking 26, flight of three on the go. Scramble!" The powerful beat of rotor blades stirred the air on the dusty ramp. The heavy B model Hueys labored through translation, vaulted from the runway and disappeared into the milky haze of the setting moon to the north.

0400: Viking 26 labored over his map in the red glow of the instrument panel lights. Tan Phu was

located 18 miles north of Chau Doc city. Its back was to a small tributary of the Mekong River, and to the front, a bare 800 meters away, was the Cambodian border. The inflight visibility was growing increasingly worse. It was limited to less than one-fourth mile laterally and forward ground reference was vague and fleeting. Paddy control placed them at 5 miles northwest of Can Tho and the ADF verified their position abeam of Binh Thuy beacon.

Going to a trail formation, the respective pilots watched the instruments while the copilot gunners were busy maintaining contact with the other aircraft.

"Viking 26, Paddy Control, Pigeons to Chi Lang 55, heading 335. Dustoff is ahead of you and advises he will remain lighted at Chi Lang until you give me Tally Ho."

0450: "Paddy control, Viking 26, Tally Ho Chi Lang."

The friendly glow of Dustoff's navigation lights marked the strip. To the northeast the haze was taking on a rose glow from the flares being dropped by "Spooky" (AC-47 flareship). Sporadic FM transmissions had revealed that Tan Phu was indeed in serious trouble and two-way radio contact had not been attained.

0500: As the blades turned down, a MACV major and NCO emerged out of the darkness of the compound and walked briskly onto the hard stand. An M49 tanker clattered noisily down the PSP and braked to a stop near the third gunship.

"Tan Phu was hit at 0045 this morning," said the major, "first with a series of light probes, then about 0300 they began to experience heavy mortar fire which was followed almost immediately by a company size assault on their northwest wall. The first two attacks were repulsed. We had sporadic radio contact until about an hour ago. The outpost to the south of them relayed that the friendly situation was quite serious. Most of the 45 eligible fighting personnel in the outpost have been killed or wounded.

"Spooky is overhead with flares and reports that there is still heavy firing on the ground. The province chief doesn't think they can hold out without help and we can't give them any from the ground.

"There is no radio contact with Tan Phu. We will have an FAC and a flight of F-100s in the area at sunup."

0530: "Spooky, this is Viking 26, flight of three entering the area over Chau Doc at 1000. Would you light the outpost area for us until we can make one dry pass?"

"Can do. Wait."

From a position 5 miles south, the location of Tan Phu could be pinpointed easily by the heavy crossfire of tracers on the ground ahead. The telltale flash of a mortar tube could be seen to the west of the outpost.

As the Vikings drew nearer, the ground fire slowed and the area suddenly began to glow with the light from Spooky's flares. Several dense columns of smoke pinpointed the outpost. A couple of dusty explosions in the compound were telltale signs that the VC mortarmen were still doing their deadly work.

0535: Viking 21 with a light fire team conducted the first pass while the XM-3 rocket ship followed the fire team at a higher altitude. The first pass revealed little except for the fact that there was still people alive in the compound and that someone to the west had a lot of ammunition to burn.

The second pass revealed what they had come for. "26 this is 21, we must have 200 of them down here on a dead run for the border. Have Spooky give us more light!"

Flashing muzzles in the dark paddies and tracers arching into the sky were answered with sharp lines of red tracers emitted from the fire tower on the deck.

"Viking 21 receiving heavy fire; breaking left. Will make next run from the northeast."

The heavy XM-3 ship bucked as each pair of rockets shot forth and then lurched spasmodically as it broke back to the left above and behind the fire tower for the next pass.

The dawn had begun to mix its own glow with that of Spooky's flares to the east.

The next three succeeding passes were made with devastating effect The early morning light revealed a profusion of black clad figures lying prostrate on the paddy straw. Heavy wheeled carts with tiered stretchers were scattered throughout the field and appeared to have been abandoned.

The last two passes received little return fire. As the fire team passed overhead, several remaining VC broke from cover and ran across the bare paddy to a small hedgerow only to fall midway as a result of a sudden burst of machinegun fire. A heavy automatic weapon sporadically engaged the fire team from the mangrove near the border. A final low level firing pass and a 24-rocket run from the XM-3 quieted it.

0610: With the day, the Air Force FAC arrived. "Viking 26, this is David 32, FAC overhead with some heavy stuff. Tell me where you want it delivered, over."

". . . Viking 26. If you could put your first strike on the east edge of the mangrove and work the succeeding ones west along the canal, I think it would do the job. The Vikings are returning to Chi Lang to rearm and refuel."

0625: "Viking 26, this is David 32. I don't know what you guys got into last night, but my observer counted over a hundred bodies between the west dike and the mangrove on our marking run."

"Roger, it's been a busy night."

CAUTION: A H

When the brain is fogged by the effects of alcohol, it may ignore such warnings as fatigue and allow the body to be pushed to the very limits of endurance

Captain Nathan G. Stackhouse Jr.

FROM THE DAY they first appeared in human culture myths have been a part of our lives, guiding our actions and influencing our thinking. Although man gradually realized that they were only "half-truths," there was no way to disprove many of them.

Along about the turn of the century, true scientific knowledge, based on proper research, began to filter down to the average citizen and the myths and folk tales began to disappear.

The misconceptions about alcohol, however, have stayed on and are still believed by many. The reason for this is not easily explained. A lack of accurate scientific knowledge can hardly be cited, since the basic nature of alcohol has been the subject of voluminous research.

In 1842 the German chemist Von Liebig (as a result of his studies) first considered alcohol as a food. He concluded, "There can be no doubt that alcohol's constituent elements have become fused with oxygen in the body, that its carbon and hydrogen leave the body as carbonic acid (carbon dioxide and water)." The consideration of alcohol as a food then is natural because oxidation is invariably accompanied by the release of heat and energy. The years of subsequent study have made only a minor correction to the original, namely a total combustion of alcohol in the body is not true—a percentage (from 2 to 10 percent) of the alcohol escapes the body unaltered through the lungs, kidneys and skin. It is then this oxidation property of ethyl (or beverage) alcohol that makes it generally acceptable as a beverage. Ethyl alcohol's ready oxidation distinguishes it from the majority of other foods whose structure is too complex for immediate oxidation. They must be remodeled by prolonged immersion in the various

ızard To Flight

digestive acids and enzyme catalysts secreted for that purpose. Only then can their essential elements be assimilated into the body. *Alcohol needs no such preparation.* It is as naturally assimilated as water.

The majority of foods are absorbed into the body through the small intestine. Even water, though almost incomparably diffusible, is confined to a single entrance, being assimilated only through the wall of the large intestine. Alcohol is more versatile. Even though the small intestine is the major location of absorption, alcohol can also be absorbed directly through the stomach, the rectum (by enema) and the lungs (by inhalation). Alcohol's direct absorption by the stomach is wrongly assumed to account for its rapid impact. In fact, the amount of alcohol absorbed by the stomach is, at most, only 20 percent of the total consumed. In addition, the absorption while being precisely regular and impervious to interference is extremely slow. This effect protects the body against a sudden paralyzing deluge of alcohol. An additional safeguard is provided the body by the pyloric sphincter which retains food in the stomach until the digestive action is complete. Repeated irritation by alcohol causes the pylorus to close. Thus the amount of alcohol which passes through the pylorus after the first drink is rapidly reduced until a regulated flow passing out of the stomach is achieved. Once in the small intestine, however, absorption is rapid, constant and complete.

Food is the chief deterrent to the prompt absorption of alcohol. Generally the larger the quantity of food consumed the slower the absorption process. An additional factor is the type of food being consumed. Foods high in protein, the most complicated of foods, require the longest digestive process

in the stomach. Alcohol thus combined with protein rich food is held within the stomach the longest.

Water, with its diluting effect, will also have a delaying effect on alcohol absorption. Carbonated beverages, including soda water, have the reverse effect however. The effervescence stimulates the pylorus, rushing the carbon dioxide, and alcohol as well, into the small intestine. It is because of this action that champagne type wines are noted for their rapid effects.

Once the alcohol has been absorbed its effects persist, without restraint, until it has been eliminated from the body by the oxidation process. Alcohol is peculiar in that it cannot be oxidized throughout the body. Its metabolism is largely confined to the liver and the oxidation process, being continuous, allows no storage of excess consumption. The alcohol circulates with the blood until oxidized.

The size and condition of the liver determines the rate of oxidation with an average liver having the capacity of destroying alcohol at the rate of one-half ounce per hour. This is equivalent to slightly less than the amount contained in a normal highball. While liver disease and malnutrition can significantly retard the rate of alcohol oxidation nothing yet known to science can increase this rate. Such expedients as deep breathing, turkish baths and vigorous exercise, currently in vogue by a vast number of serious elbow benders, is wholly without scientific basis. The universal faith in black coffee is also baseless. The truth of the matter is the stimulant caffeine within the coffee can arouse a drowsy drunk but will have no effect on the alcohol concentration in the blood stream.

Although the liver can begin the oxidation of alcohol within seconds of its absorption into the bloodstream, the liver can only handle a very small percentage at a time. The bulk of the alcohol thus leaves the liver to be transported throughout the body by the bloodstream while awaiting its turn to be oxidized by the liver. As the alcohol laden blood passes through the lungs a minute quantity is released from the blood and exhaled as vapor. Alcohol therefore is always present in the breath in an unvaried proportion as long as it is present in the bloodstream. A determination of the alcohol present in the breath therefore makes it possible to gauge the precise level present in the blood.

The percent of alcohol present in the blood which results in measured impairment of judgment and vision is over .05 but less than .15. Concentrations in excess of .15 result in increasing intoxication and danger. Since the effects of alcohol vary with the concentration in the blood with the same amount of alcohol in their bodies, large individuals are less affected than smaller ones. The following chart indicates

BLOOD ALCOHOL CHART

BODY WEIGHT	DRINKS											
	1	2	3	4	5	6	7	8	9	10	11	12
160 LBS	.023	.047	.070	.094	.117	.141	.164	.188	.211	.234	.258	.281
180 LBS	.021	.042	.063	.083	.104	.125	.146	.167	.188	.208	.229	.250
200 LBS	.019	.038	.056	.075	.094	.113	.131	.150	.169	.188	.206	.225
220 LBS	.017	.034	.051	.068	.085	.102	.119	.136	.153	.170	.188	.205

DUE TO ITS CONTINUOUS OXIDATION, THE CONCENTRATION OF ALCOHOL PRESENT IN THE BLOOD CAN BE APPROXIMATED BY SUBTRACTING .015 FROM THE CHART FIGURE FOR EACH HOUR WHICH HAS ELAPSED SINCE THE FIRST DRINK.

an estimate of the percentage of alcohol in the blood by the number of drinks in relation to average body weight.

Contrary to popular myth, alcohol acts as a depressant not a stimulant. Constant proof of this is the ever present evidence of the impending paralysis of the nervous system—the fluid, tripping tongue, antic-behavior, etc. As the bloodstream carries the alcohol continuously through the body, it comes into constant contact with the cerebral cortex or the mind. It is here that alcohol's numbing presence is first felt. Indeed, most investigations have concluded that even minor amounts of alcohol in the bloodstream have a pronounced effect on the mind's ability to make razor sharp decisions. Thus, the presence of even the alcohol of one beer in the bloodstream can dull a keen, fine honed mind into a thrashing bludgeon.

Due to its elusive, fleeting and hidden nature, the subjective effects of alcohol cannot be depicted exactly. This same effect which makes a man the "lampshade on the head, life of the party" at one time can make the same man a brooding depressed non-conversationalist at the next party. An indication of the nature and sequence of happening of alcohol on the mind can be set forth. When the bloodstream brings the first alcohol to the brain the highest level of mentality is the first to falter. The smallest trace of alcohol in the brain can cause an almost immediate slacking of the neural tension essential to full cerebration. The governing grip of the mind on judgment then begins to loosen, emotions normally held in check drift into consciousness and inhibitions lift. The alcohol-fogged mind sees itself in a different light—that of swelling memory and super keen wits. In truth, however, the overwhelming evidence is that alcohol decreases the mind's alertness and efficiency for performing tasks. The effects of alcohol are, however, only temporary. It does not destroy the brain cells, nor does it corrode or dissolve them. When the alcohol is oxidized by the liver the brain arouses itself and assumes its normal state.

The body is not as fortunate as the brain when it comes to alcohol. The body is saddled with the anguish of the hangover as the effects of alcohol wear off. The symptoms of a hangover are infinitely varied and run the gamit of physical and emotional distress known to medicine. The usual manifestations which persistently characterize a hangover include fatigue, headache, thirst and often vertigo and nausea. Of these the first is the most consistent and unconsciously endured. Fatigue is of course, like pain and fever, a sensory warning. It alerts the brain to the approach of muscular exhaustion. When the brain is fogged by alcohol it fails to promptly grasp this notification of impending strain, with the result that the body may be unwittingly pushed to the very edge of endurance by the simple act of standing around, "having a few with the boys."

The usual source of hangover headaches is dilation of the cranial arteries and the victim's particular blend of physical and mental fatigue. Thus, the stress encountered at a party, the need to meet and entertain people, combined with the general overstimulation resulting in fatigue are the prominent causes of hangover headache.

Another hangover symptom—thirst—is wrongly termed "dehydration" by many. The simple fact is that alcohol consumed in larger quantities brings about a change in the distribution of body fluids. There is an increase in the extracellular fluid at the expense of the fluid in the body cells resulting in a parched thirst even though total body fluid may be normal.

Unfortunately there is no ready remedy for the discomforts of a hangover. Treatment is limited to ingestion of one of the acetylsalicylic acid clan, rest and the relentless passage of time. Twelve hours will usually suffice to mute the unwanted tympani.

Having skillfully navigated this far through the voluminous notes you may wonder, as an aviator, how all this affects you. Take heart, read on, for your goal is near. The USARV, May 1968, AVIATION PAMPHLET tells us that true pilot error is the loss of the, "willingness to comply with what he has learned and what sound judgment tells him to do."

Take your newly acquired information about alcohol and apply it to the following situation.

A 100-plus hour a month combat pilot flying an early morning mission after his nightly sojourn to the club.

A staff officer faced with a "must make minimums" Saturday morning flight after the unit's combination hail and farewell and promotion party.

Two experienced aviators on the homeward bound leg of an extended cross-country flight after "dropping by" to see "old Bob" and painting his hometown red, white and green.

Take any situation that you may have been in or read about and add to it one of the "moments of sheer terror" that goes along with the "hours and hours of boredom" —a bullet takes out your servos, a tail rotor failure, rapidly deteriorating weather or even engine failure —take these, mix in any amount and proportions, add alcohol and its effects—the result can be, and usually is, unhealthy.

Anyone interested in a new regulation to post the following in all clubs and pilot's lounges? "Caution, drinking may be hazardous to your flight pay—and your health!"

crash sense

the following 28 pages prepared by the
U.S. Army Board for Aviation Accident Research

L. L. Bishop
R&M Control Division
Systems Engineering Directorate
USAAVSCOM

TALCMOR The Aircraft Life Cycle Maintenance and Ownership Record

new management tool for analysis of maintenance performed on fielded aircraft

THE RELIABILITY & Maintainability Control Division of the Systems Engineering Directorate, USAAVSCOM, has recently developed a system called The Aircraft Life Cycle Maintenance and Ownership Record (TALCMOR). The basic product of this system is a chronological listing, starting with the acceptance of an aircraft into the Army inventory, comprised of all maintenance actions performed on the aircraft, transfers of ownership, and scrappage or salvage actions which occur during the life cycle of the aircraft. Within the short period of time that has passed since the system was developed, the demand for TALCMOR has been greater than was anticipated during the original design. The format of the data presented in TALCMOR and the ease with which the data is obtained has proved to be a valuable tool for those who require a historical record of maintenance performed on any selected aircraft.

For example, problems recently encountered with the tail rotor hub on an aircraft led to a request for this particular aircraft's TALCMOR. TALCMOR provided a record of scheduled and unscheduled maintenance recently performed on the tail rotor hub. In addition, TALCMOR aided personnel in determining whether maintenance or lack of maintenance performed on other parts of the aircraft were influencing factors in the tail rotor hub malfunction.

Another request for TALCMORs occurred when a maintenance shack was destroyed in RVN. The records of 18 aircraft were requested so that accrued time on time change components could be established. Otherwise, these items would have had to be removed and scrapped or overhauled prematurely.

The only data required to initiate TALCMOR is the FSN and serial number of the aircraft. TALCMORs are presently available on all aircraft of the following TMS (type, model and series) fleets: UH-1B, UH-1C, UH-1D, UH-1H, UH-1M, CH-47A, CH-47B, CH-47C and AH-1G.

It is possible to develop TALCMORs on all Army aircraft without difficulty. However, action is being withheld until demands for other TALCMORs are indicated.

TALCMORs are developed from TAERS records which are transcribed on magnetic tape and stored

TABLE 1
Summary of TAERS Inputs For All
UH-1B/C/D/H/M, CH-47A/B/C, And AH-1G Aircraft
Since TAERS Inception Through December 1968

DESCRIPTOR OF THE PARTICULAR VALUE BEING MEASURED	NUMBER OF AIRCRAFT AFFECTED BY THE DESCRIPTOR		MAINTENANCE ACTIONS REPORTED ON 2408-3 FORMS		MAINTENANCE ACTIONS REPORTED ON 2407 FORM		TOTAL MAINTENANCE ACTIONS (2408-3 PLUS 2407)	
	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
Total number of maintenance actions in the TAERS data bank	5,872	100%	1,234,447	a. 55.2%	1,001,508	a. 44.8%	2,235,955	100%
Rejected because the aircraft numbers reported on the forms were not valid	4,244	72.3%	19,592	b. 1.6%	18,920	c. 1.9%	38,512	a. 1.7%
Total number of maintenance actions that had valid aircraft serial number	5,872	100%	1,214,855	d. 55.3%	982,588	d. 44.7%	2,197,443	a. 98.3%
Maintenance actions that had zero or no flight hours shown for when the maintenance action was accomplished	1,788	30.4%	3,710	e. 0.3%	46,937	f. 4.8%	50,647	a. 2.3%
Maintenance actions that had unreasonable flight hours shown for when the maintenance action was accomplished (greater than 5,999 flight hours)	930	15.8%	2,577	e. 0.2%	3,922	f. 0.4%	6,499	a. 0.3%
Stray maintenance actions that were reported during a gap*	4,040	68.8%	12,566	e. 1.0%	15,130	f. 1.5%	27,696	a. 1.2%
Total maintenance actions for valid serial numbered aircraft that were omitted because of zero hours, unreasonable hours, and stray actions in a gap*	4,623	78.7%	18,853	e. 1.6%	65,989	f. 6.7%	84,842	a. 3.8%
Total maintenance actions used for analysis after all eliminations were deducted from the total	5,690	96.9%	1,195,994	e. 98.4%	916,599	f. 93.3%	2,112,593	a. 94.5%

a. Percent of 2,235,955 total actions
b. Percent of 1,234,447 2408-3 total actions
c. Percent of 1,001,508 2407 total actions
d. Percent of 2,197,443 actions that matched by aircraft serial number
e. Percent of 1,214,855 2408-3 actions that matched by aircraft serial number
f. Percent of 982,588 2407 actions that matched by aircraft serial number

*A nonreporting period of 14 or more flight hours

in the USAAVSCOM TAERS data bank. TAERS forms used to develop TALCMORs are:

- 2407 Maintenance Requests
- 2408-3 Equipment Maintenance Records (Organizational)
- 2408-7 Equipment Transfer Reports
- 2408-8 Equipment Acceptance and Registration Records

The records in the AVSCOM TAERS data bank were sorted to select the above records for the nine TMS fleets. The records for these fleets were further sorted to arrange all records submitted for a particular aircraft in chronological sequence from the first record through the last record that has been stored in the USAAVSCOM TAERS data bank. All of the above noted TAERS records for the nine TMS fleets should be in the AVSCOM TAERS data bank.

Storage of these records commenced with the inception of TAERS and the file is updated as new records are received. Therefore, the chronological sequence of the above records for a particular aircraft should reflect all of the reported activity since the aircraft was introduced into the Army inventory or since the inception of TAERS, if the aircraft was introduced into the inventory prior to TAERS.

The only 2407 records that were accepted in the chronological listing were those that recorded maintenance actions accomplished on the aircraft. Thus, the chronological listing reflects:

1. When the aircraft was introduced into the Army inventory.
2. All maintenance actions performed on the aircraft, regardless of the echelon that accomplished the maintenance actions.
3. Owning organizations during the life of the aircraft.

This chronological listing has been named *The Aircraft Life Cycle Maintenance and Ownership Record* because it presents each maintenance action which has been performed on the aircraft, who accomplished the maintenance, manhours to accomplish, type of maintenance action performed, flight hours and date when accomplished, reason for the maintenance action, unit which owned the aircraft during designated maintenance periods and other relevant data completed on the forms. If records are missing, it becomes immediately obvious due to the number of flight hours accrued on the aircraft from one reported maintenance action to the next. A review of many TALCMORs revealed that the majority of aircraft have some missing records. However, it may be possible to obtain copies of some of these records from owning organizations.

An initial analysis of all the 2408-3 and 2407 records of maintenance actions performed on the nine TMS fleets revealed there is a large volume of data available for analysis, as indicated in table 1. It should be noted that a maintenance action refers to any maintenance event on an aircraft, without distinction for scheduled, unscheduled, corrective or preventive maintenance, or the echelon that accomplished it.

When a field activity reports a maintenance action, it identifies the type of maintenance performed by the use of a maintenance action code. The maintenance action code and its identifier are shown in column 1 of table 2. Of 2,112,593 maintenance actions performed on the 5,690 aircraft in the nine TMS fleets, the number of times a particular type of maintenance action was accomplished is shown in column 2 of table 2. A further analysis of these maintenance actions by TMS fleets has been performed and the results will be published in a report on the initial validation of TAERS maintenance records.

An analysis of TALCMOR reveals many details on specific maintenance events, the frequency of occurrence or nonoccurrence, and who performed them. This type of data allows analyses to be performed on selected aircraft for:

1. Failure trends
2. Frequency of occurrence for replacement, repair, adjustment, calibration, inspection, service, removal and reinstallation, test, etc., on specific items
3. Design deficiencies
4. Contributing factors in accidents
5. Scheduled vs unscheduled maintenance requirements
6. Test items installed on selected aircraft, such

as components developed under Product Improvement Programs (PIP)

7. Cause of failure of specific items
8. Aircraft availability
9. Effect of environments by comparative evaluations of sample aircraft
10. Effect of use rates on maintenance requirements
11. Man hours to accomplish each maintenance action

The list of types of analyses that can be performed from TALCMORs could be continued for many pages, but this partial list shows that the large number of variables for many events that occur in a particular sequence enable numerous analyses to be performed. This is the reason for the high interest shown in TALCMORs.

TABLE 2
Frequency of Accomplishing
Each Type of Maintenance Action
For UH-1B/C/D/H/M, CH-47A/B/C
And AH-1G TMS Fleets

(1) TYPE OF MAINTENANCE ACTION ACCOMPLISHED	(2) TOTAL NUMBER OF ACCOMPLISHMENTS	(3) PERCENT OF ALL MAINT. ACTIONS	(4) ORDER BY THE HIGHEST FREQUENCY OF ACCOMPLISHMENT
A. Replace	468,889	22.195	2
B. Adjust	42,773	2.024	9
C. Repair	126,756	6.000	6
D. Calibrate	3,403	0.161	11
E. Services	803,063	38.013	1
F. Initial Inspection	243,901	11.119	3
G. Final Inspection	129,432	6.127	5
H. MWO	20,724	0.981	10
J. Test	0	0	16
K. CMMI	2,235	0.012	15
L. Remove and Reinstall	77,808	3.683	7
M. Checked, Not Reparable This Station	2,430	0.115	12
N. Checked, Not Reparable	1,157	0.055	14
P. Checked, Serviceable	55,920	2.647	8
T. TB Compliance	1,495	0.071	13
Other	143,607	6.797	4
All Maintenance Actions	2,112,593	100.000	-

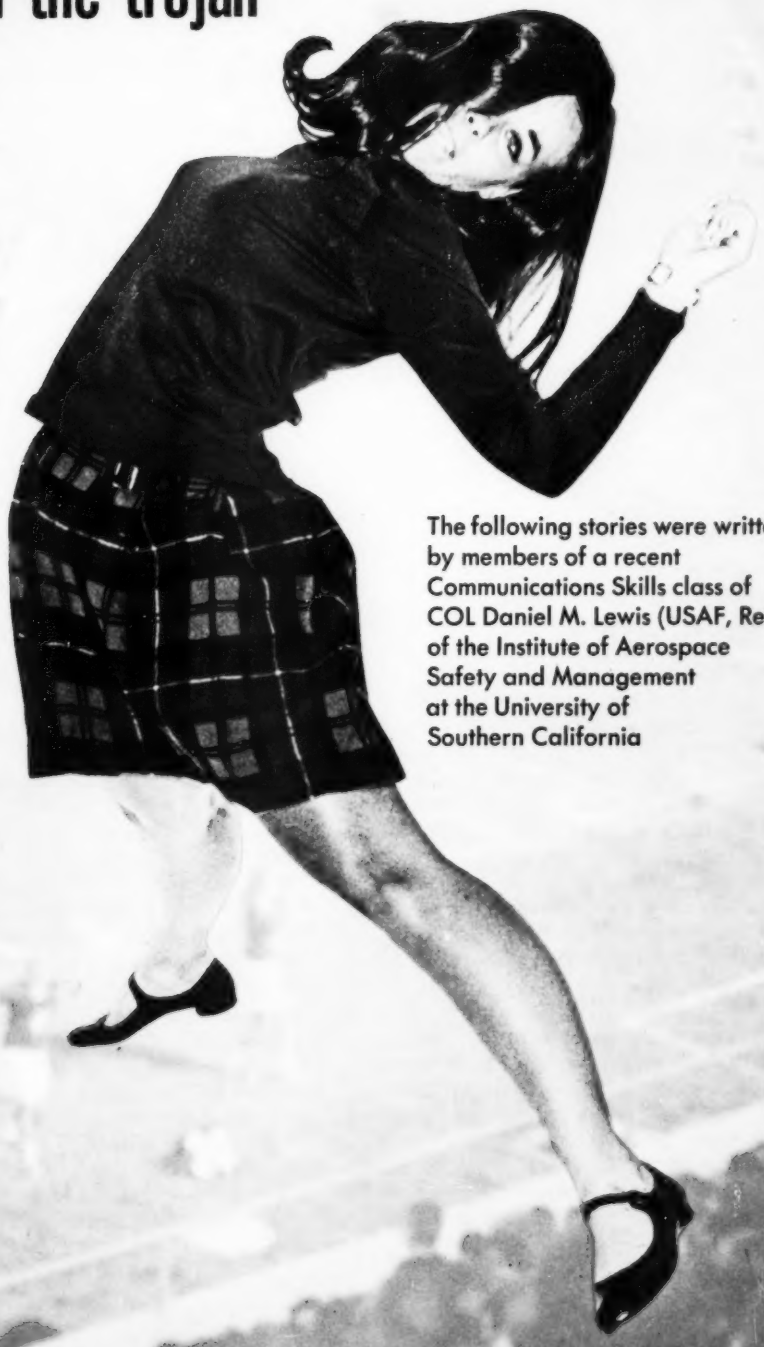
TALCMORs are used in the Reliability and Maintainability Mathematically Integrated Totals (RAMMIT) system design to validate the data submitted, to make specific measures by aircraft and TMS fleet, to perform TMS life cycle studies and to perform numerous analyses of field experiences reported via TAERS records. There have been analyses performed on the initial validation data for the nine TMS fleets. Reports which present the analyses are now in preparation and will be available to field activities. These reports will reveal the number of maintenance actions performed, the number of aircraft flight hours, the number of flight hours of acceptable maintenance reporting, the number of flight hours of nonacceptable maintenance reporting, the average flight hours between maintenance actions and other data for each aircraft. This will reveal how a selected aircraft compares with other aircraft in the same TMS fleet.

Studies of TALCMORs and values derived from TALCMORs have shown that valid TAERS data can be an effective management tool. However, nonreporting of maintenance actions and omissions and errors on TAERS records make it necessary to statistically adjust the data for an analysis of a TMS fleet. This statistical adjustment cannot be applied to a single aircraft and the errors and omissions for a particular aircraft lessen the value of TALCMOR for that aircraft. The owning organization or the organization that is accomplishing or not accomplishing the maintenance can be identified for all periods in the life of the aircraft. As more programs are developed under the RAMMIT program, there will be increasing emphasis on TALCMORs. Thus, reporting organizations will be requested to resubmit missing and incorrect records so that valid TALCMORs can be developed for their aircraft. Valid TALCMORs are of great value in the analysis of field experience and allow the development of equipment and support for field activities that are submitting maintenance action data via TAERS.

All requests for TALCMORs should be forwarded to: Commanding General, U.S. Army Aviation Systems Command, ATTN: AMSAV-R-EC, P.O. Box 209, St. Louis, Mo. 63166, with the following information given for each request:

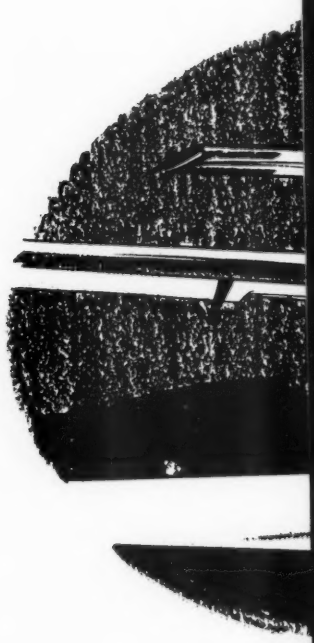
1. Reason for request
2. FSN, TMS (type, model and series), and serial number of the aircraft
3. When required
4. Return address

tales from the trojan



The following stories were written by members of a recent Communications Skills class of COL Daniel M. Lewis (USAF, Ret) of the Institute of Aerospace Safety and Management at the University of Southern California

Truth Or Consequences



I HAD JUST finished a big dinner and was looking forward to an evening of television at home with my family. It had been one of many hot summer days and I was pleasantly tired and thinking of enjoying a cold beer when the telephone rang. My oldest daughter answered, as most of the calls were for her. Much to my surprise, this call was for me.

The duty officer from my unit told me a pilot was needed to fly an emergency mission to Green River, Utah. Since I had recently flown there, I was the most logical candidate. For a brief moment, I almost wished I had drunk that beer. A young officer had been critically injured in a jeep accident and my mission was to fly his wife to his side as soon as possible.

I hastily changed into my flight clothing and packed a small bag. It was 1930 when I arrived at flight operations and the duty officer explained that the Caribou was ready to go and the crewchief was standing by. A warrant officer was on his way and would be my copilot. I had flown with Joe frequently and was glad he was going along, as he was a good pilot and friend.

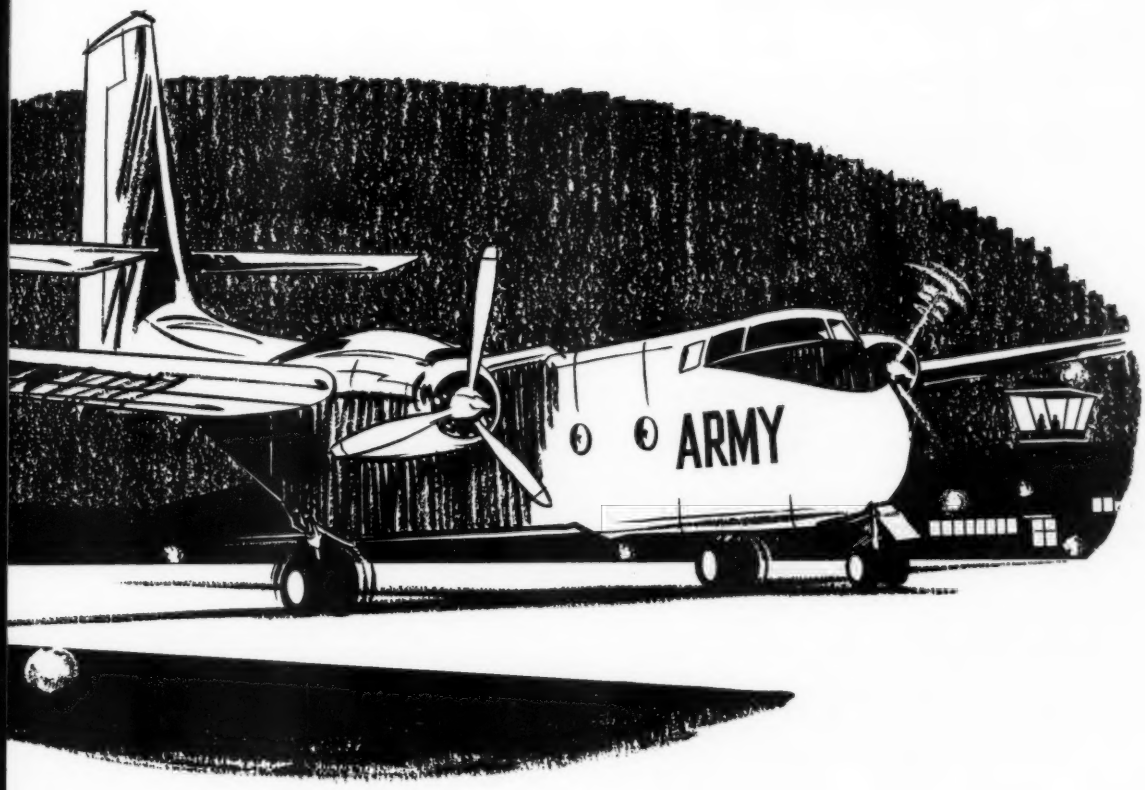
Our shortest route would be to cross the Rocky Mountains at Albuquerque, then northwest to Farmington, New Mexico, then further north to Green River. The weather forecaster reported a large squall line extending from the middle of Texas to northern Colorado on the eastern edge of the Rockies. To avoid the weather, my only alternative was to fly south of it and make a fuel stop at El Paso. The weather was forecast to be clear all the way along this route.

As I was planning the flight, Joe arrived and I asked him to preflight the airplane and to taxi it in front of operations. I filled out an IFR flight plan to El Paso almost from memory, as I had made that flight at least 50 times before.

At about 2000, our passenger arrived, accompanied by an officer from her husband's unit. I told them we would be leaving in 15 minutes, with a stop in El Paso due to the weather. The young lady appeared very tired and her companion explained that she had been given a sedative.

After boarding the plane, I told the crewchief to make sure our passengers were comfortable and to tell them we would be landing in El Paso in about 4 hours. I copied the IFR clearance as I had filed it, which was the most direct route to El Paso. We took off and were climbing easily as the local control turned us over to Fort Worth Center. It appeared we were going to have a long and uneventful flight. It had proven exactly that as we cruised at 8,000 feet until we were about an hour out of El Paso. Our flight was then being monitored by Albuquerque Center and, due to the mountains, we were not under radar control.

The weather had been clear, but it was very dark without any moonlight. The only visible lights were a few lightning flashes to the north and the reflection in the windshield from the lights of Hobbs, New Mexico. Suddenly, I felt a slight bump, more through the controls than the airplane. Then, almost immediately, I felt a sharper one. Joe reached down and switched on the weather radar, but the screen



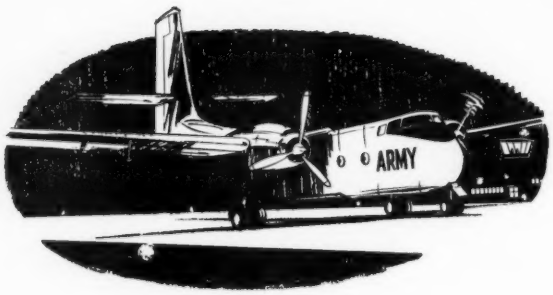
remained dark. Angry with myself for not checking the radar sooner, I asked Joe to contact the center and request permission to switch to Hobbs radio. Hobbs reported the only storms showing on their radar were to the north and northwest. The weather along our route should remain clear.

Joe had switched back to center frequency when the bottom suddenly dropped out. We had flown into a cloud and it was all I could do to keep the airplane right side up. As we were being tossed about, I was thankful I had told the crewchief to make sure the passengers fastened their seat belts after the first bump. We were flying through heavy rain and lightning was flashing all around us. It seemed hours passed, but it was only a few minutes before we were in calm air again. Concerned about our lady passenger, I breathed a sigh of relief.

We saw the lights of El Paso a short time later and touched down about 30 minutes after midnight. We looked the airplane over closely, but found no signs of damage. Joe took our passengers to the snack bar. We had nearly 4 hours of flying ahead of us and it would take 30 minutes or more to refuel. I phoned the weather station and was relieved to hear the thunderstorm activity was confined to the eastern slopes of the mountains. Our flight to Green River should be clear all the way.

Later, at the end of the runway, we received our clearance IFR to Farmington, then VFR to Green River, climb to and maintain 10,000 feet. I was beginning to feel tired. Our Caribou broke ground in the thin mountain air. As we climbed to altitude, Joe and I kept up a running conversation to stay awake. It was 0130 and neither of us had slept since 0600 the previous day.

We leveled off at 10,000 feet and all the gauges



indicated normal as we throttled back and the engines took up a steady cruise beat. We were flying north in a valley about 20 miles wide, with mountain ranges on both sides. Some of the mountains were as high as we were. The crewchief came forward and said both of our passengers had fallen asleep after takeoff.

All at once, I sensed something wrong! I looked at Joe and we both checked the instruments. All gauges were still in the green. The crewchief went aft and looked at both engines and reported no visual signs of any trouble. I was rechecking the engine instruments when I saw the torquemeter waiver slightly on the left engine. The engine faltered, caught again, then felt as if it were shaking apart. As I reduced the throttle and retrimmed, the engine smoothed out.

Joe contacted Albuquerque Center and requested permission to switch to Truth or Consequences radio. He explained our situation, requested the airfield lights be turned on and reported we were approximately 15 miles south. I had been experimenting with the bad engine and found that it would run smoothly at reduced power, but would run rough and threaten to stop when power was increased. All pressures appeared normal and there was no sign of a fire, so I elected not to feather it. I told the crewchief to tell our passengers we were having engine trouble and would have to land at Truth or Consequences.

As I started a slow turn over the airfield, I felt the airplane shudder. Joe was pointing at the No. 2 oil pressure gauge which had dropped to zero. The crewchief reported a large red ball of flame coming from the No. 2 engine and I had no choice but to feather and shut off all fluids to it. As the propeller came to a stop, the fire went out and we all breathed sighs of relief.

I asked Joe for the landing checklist and he read it off calmly, though I knew he had to be as tense as I was. His apparent calmness gave me confidence as we descended rapidly to traffic pattern altitude. We made slow turns within the pattern, staying in close to the runway lights. I knew we could make only one attempt and it had to be right. I told myself, "Above all, don't land short!" With one engine feathered and only limited power available from the other, there was no room for error. As we turned final, I gently lowered the flaps and deliberately remained slightly fast and high.

We landed about a third of the way down the runway and the double row of lights seemed to extend endlessly in front of us. As I carefully applied the brakes, I silently thanked someone for building a long runway. Both of my legs were shaking as we taxied towards the parking ramp. Joe looked completely exhausted.

I phoned Holloman AFB from the FAA station and requested an airplane be sent to Truth or Consequences to take our passengers on to Green River. They dispatched one immediately. By the time I contacted our base operations, the sun had begun to rise over the eastern mountains. Despite our fatigue, none of us wanted to sleep until we had discovered the causes for our engine troubles. As I walked toward the airplane, Joe and the crewchief were removing the last of the engine cowling.

No. 2 engine had broken a piston rod, allowing the piston to hit the valves in that cylinder and rupture the push rod housing, resulting in the loss of the engine oil. The oil had burned on the exhaust ring, causing the ball of fire. The only reason for the loss of power from the No. 1 engine was faulty spark plugs. At 10,000 feet they had broken down and caused the engine to malfunction.

It was 8 days before the Caribou was ready to fly again. We had to replace No. 2 engine and install all new spark plugs in No. 1.

Shortly after our return, I inquired about the condition of the young captain. The report that he was off the critical list and was expected to make a full recovery made that long night seem worthwhile.

EARLY ONE MORNING the flight activity commander of the local unit had a call, telling him there had been a helicopter crash. The pilot was killed and the crewchief escaped with minor injuries. The duty officer making the call requested assistance as the officer killed was the only aviator assigned to the post.

The preaccident plan was put into effect and the investigation board members were directed to report to operations at 0800, prepared to remain in the field all day. It had been snowing off and on for 2 days and there was 15 inches of snow on the ground. Strong winds had blown it into 2- to 4-foot drifts.

The board received a briefing at 0800, obtained a photographer and proceeded to the accident site. State police and local firemen were the first to arrive at the scene. They helped extinguish the fire and kept the area clear of unauthorized personnel until the MPs arrived. The board then had the task of determining what caused the accident and how the crewchief lived through an unsurvivable accident. Photographs were taken, crash debris charted and witness statements recorded.

It was learned the state police received a call for help to carry an expectant mother from her home 20 miles outside the city to the city hospital. The police were unable to take her because of the snowbound roads. At 0200, a call was placed to the local military post for helicopter assistance. The duty officer alerted the pilot, operations sergeant and crewchief who immediately began to prepare for the flight.

The pilot failed to check the weather, which consisted of snowshowers, low ceilings, reduced visibility and areas of moderate turbulence. He also overlooked the fact that he had not received a night checkout in the type helicopter he was to fly. At 0300, he and the crewchief took off. A few minutes later, they lost radio communications and had to rely on radio relay from another nearby airfield. The first message was, "Proceed to a schoolhouse in the vicinity of the pickup site, maintain enough altitude to hold visual contact for a 5-mile radius. State police will be at intersection with red dome light on. House is one-half mile from the car. Man will be outside with flashlight. Subject is to be delivered to city stadium where an ambulance will be waiting."

Following the snow-covered roads, they encountered lowering visibility to about one-half mile. A few minutes later, the tower received a call from the pilot that he was in a snowshower, IFR, partially disoriented and was returning to get his bearings. He made a slow turn to the right, then a turn to the left which placed them southwest of their pickup point. After 40 minutes of trying to reorient himself, he located a landmark and decided to return and make a second attempt to rescue the woman. The tower called and advised him to be on the lookout for three flares at the road intersection. He was also advised that a state trooper would be on the highway with his red dome light flashing.

The pilot soon saw a flashing light, but it turned out to be a traffic light. He then made two circles over the community and advised the tower he had the flares in sight and was making an approach. After descending to approximately 100 feet, he called and reported they were not the flares. It was later learned the lights were from a milk truck parked on the road. He continued to fly at low altitude over the rolling snow-covered terrain. A few minutes later, according to the crewchief, something caused a fog or mist to envelope the helicopter and vapor drops appeared on the windshield. At this time, the pilot advised the tower he was IFR and was getting out of there. The helicopter made several 360-degree turns to the left. After the turns seemed to stabilize, they began to experience severe turbulence. The helicopter pitched right, then left. The nose went up, then down. It then began a climbing right turn, hit the trees, crashed and began to burn. The initial fire was not too severe, but the secondary explosion occurred seconds later and engulfed the wreckage in 50- to 60-foot flames. The crewchief, by some means unknown to the board or himself, managed to climb out of the inferno into the snow and safety. He attributed his survival to the safety film *Dress to Live*. He reported he had dressed to live on each flight since he saw the film.

P.S. The mother had her baby and both survived, as they have since long before helicopters were invented.

snowbound **EMERGENCY?**

AS AIRCRAFT maintenance officer, my job was to make sure the command had enough aircraft, by type, to meet training requirements. An availability vs requirements check on Tuesday showed we were in good shape for the remainder of the week. Maintenance crews were performing scheduled maintenance and everything was going along well.

At approximately 0700, I was requested to test fly a U-8 that had just come out of field maintenance. I accepted and told the contractor that I would file for an 0800 takeoff. I told my maintenance sergeant that I was going and asked him to go along as my recorder.

We found the left main strut bottomed out during preflight and had to wait 15 minutes for maintenance to repair it. I started the engines and called the tower for taxi and takeoff instructions. We were cleared to runway 02 for runup. After runup, we were cleared and I started to take off. At approximately 50 knots, the nose and right wing dropped. The airplane was falling out from under me and I realized I had to do something and do it quick!

I pulled back on the control column and heard a noise which sounded like props striking the runway. I pulled the column full back, lifting the airplane off the runway. I was determined to fly if it would stay in the air. If it wouldn't, I had made up my mind to cut the power and go in straight ahead. It flew.

I held 45 inches of manifold pressure until I had 120 knots, then I put the flaps up and told the sergeant to raise the gear. He did, but the light in the gear handle would not go out. The gear was not up and would not come up. I called the tower to report gear trouble, but was unable to contact them.

I had apparently lost my communications also. We climbed to altitude to see if we could get the gear to come down and lock. We cycled the gear six times, but could not get an indication of down and locked. The nose gear would indicate down and locked, but not the main gear. By pulling the gear circuit breaker and manually pumping the gear lever, we were able to get the left gear to also indicate down and locked, but not the right gear. We cycled the gear manually four times but could not get the right gear to indicate down and locked.

I considered the possibility that the right gear may have been down and locked, but giving a false indication, and decided to make a high speed landing. Maintaining 110 knots, I set up an approach to the runway. I kept the left wing low until I felt the left gear on the runway. Holding the airspeed constant, I gently lowered the nose gear and right gear to the runway. The right gear would not hold and I went around.

We tried to call the tower on all UHF and VHF frequencies. We also tried to receive on omni, without success. We later learned that we had lost our antenna during takeoff when the airplane fell out from under us.

We flew by the tower several times to make sure they knew we had problems. Unable to contact anyone, we climbed back to altitude to cycle the gear again. The results were the same. I had tried everything I knew, without result, so I decided to make a gear-up landing. I told the sergeant and he agreed that it was the thing to do. We made several practice approaches to pin down the glide angle and to go over the gear-up landing procedures. On one approach, I feathered the number one propeller and we saw that all three blades had hit the runway.

After I restarted the number one engine, another U-8 came up and flew beside us. The pilot motioned us to follow him. We began to fly in the direction of an Air Force base. The other U-8 pilot was talking to the tower and when he was tight on my wing, I could hear him. Using hand signals, I finally managed to let him know I could hear him.

He told us that our right main gear was hanging and that it would not cycle up. He asked me what I was going to do. Using hand signals, I motioned that I was going to make a gear-up landing. He said the Air Force base would only foam the crosswind runway. I signaled that I would land at my home base. He relayed this to the tower and requested the runway be foamed.

We made two more practice approaches and the other pilot told us they were having trouble foaming the runway. It seemed that the chemical and water were not mixing properly. But he told us not to worry because they would have it fixed in a short time. He suggested a break, so we climbed back to altitude and waited.

After the runway was foamed, I descended to traffic altitude and prepared to make my approach. I pulled out the step circuit breaker so the step would not extend when I shut down the number two engine. We manually pumped the gear into the up position. The pilot of the other U-8 reported that the right main gear was still hanging and that the left main gear and nose gear were in the up position.

I set up a wide downwind, checking to make sure the sergeant and I were strapped in good and tight, with shoulder harnesses locked. I flew a longer than normal downwind to give us plenty of time on final.

On final, I feathered the number one propeller, positioning it by hitting the starter button until one blade was in the up position. When I was sure I had the field made, I shut down the number two engine and feathered the propeller, again positioning it with the starter button. I pulled the mixtures off, switched the mags off and dropped 15 degrees of flaps. I turned the master switch off.

Approximately 10 feet from the runway, I leveled the airplane and lowered the right wing slightly. As the ground came closer, I felt the right gear touch the runway. Was it going to hang up or would it retract up into the wheel well? The airplane remained level and continued down the runway. The gear was retracting! I held the airplane as level as I could and continued until I felt the left gear touch the runway. We were down! My only problem then was holding it on the runway and on the foam.

The airplane began to turn to the left. I applied right rudder and a little right brake. It straightened out and held its heading. I had instructed the sergeant that he was to open the door as soon as I was sure I could keep it on the runway and for him to get out when we stopped. As we began to slow down, he opened the door. We came to a stop and got out. It had been a long 2 hours and 50 minutes!

Inspection of the landing gear system revealed the toggle switch was defective and malfunctioned, causing the landing gear to retract during the takeoff roll. Pilots who had previously flown the airplane were questioned and it was discovered the switch had been acting up, but had not been written up in the log book. As a result of this mishap and one other, a message was sent out with the following information:

"Any time that the gear does not correspond to the position of the gear selection handle, it is an indication of switch malfunction and the switch should be written up in the log book."

HURRAH FOR GLIDER STRIPS

AS DAWN BROKE, I dodged ruts in the road to the airfield. Several puffs of clouds dotted the West German skies. Reminding myself of the futility of trying to predict European weather, I began to think about the flight ahead. It would be a welcome break to fly to Bremerhaven to pick up a friend.

The jolt of my car striking the curb smashed my daydreams. I walked into operations and raised weather on the hot line. A sleepy-voiced forecaster gave me the typical spring day briefing. There would be increasing cloudiness until a weak frontal passage in early afternoon. Rapid clearing would follow, accompanied by strong southwesterly winds. Minimum conditions along my flight route would be 1,000 feet and 2 miles visibility.

After the required preliminaries, I was soon on my way. There was plenty of time for me to mentally review the details of my flight. After 2½ hours, I would land at Bremen and refuel. From there, it would only be a 30-minute flight to Bremerhaven. The voice of the tower operator at Bremen provided welcome relief to 2½ hours of boredom. I landed, refueled and was airborne again just as my estimated ground time expired. What a perfect flight, I thought.

A half hour later, I had landed at Bremerhaven, picked up my waiting friend and headed southwest for base, 3 hours away according to my flight plan. Minutes after takeoff, we encountered the weak frontal system the forecaster had predicted. It began with a light drizzle, and intensified until I could barely see through the windshield. I discovered that by turning to the west and flying for a minute or less, I would fly out of the rainshowers. I then looked to the southwest and picked out an area where the ceiling and the visibility didn't look too bad. I turned southwest then and plunged into the weather. After enduring IFR conditions for as long as I dared, I turned to the west to fly out of the

rainshowers. I continued this routine until I encountered a rapidly clearing condition.

I climbed to 5,000 feet and began to glance around the cockpit. I noticed that both the main and auxiliary fuel tanks were indicating half full. This was less fuel than I thought I should have, so I tried to explain it away. I decided that flying in and out of weather for the past hour and a half had accounted for most of it. And what was that the weatherman said? Something about strong southwesterly winds after frontal passage. I half frantically searched the pockets of my flight suit until I found my copy of the weather briefing. There it was—wind, 210 degrees at 20-25 knots. My heart sank as I imagined running out of fuel over wooded terrain. Suddenly, an ingenious plan took shape in my mind. Since both tanks indicated half full, why not see how long it took to run one dry and keep track of the distance it took us? I would then have a good idea whether or not the remaining tank would take us to base.

When the engine sputtered, I quickly changed the selector to the main tank. I had traveled more than three-fourths the remaining distance on half a tank and I still had a half tank remaining. I was greatly relieved and congratulated myself for being so wise. I glanced at the fuel gauge. Better than one quarter tank remaining and only 10 minutes to fly. We had it made!

A glider strip appeared just ahead. I recalled the many times I had landed there while practicing short field techniques. As I raised my line of sight, I picked out the top of the base tower above the rolling countryside. Just 5 more minutes and we would be home. Just then, the engine ran rough for a few seconds and stopped. I immediately diagnosed the problem as fuel starvation and turned downwind for the glider strip. I called the tower, told them my situation and asked if they would send some fuel to the glider strip. The tower operator nonchalantly said, "Roger." Almost as an afterthought, he said, "Give me a call when you're on the ground." I replied, "Roger," and accomplished my emergency landing checks. As I was turning off the radios, I overheard other pilots on tower frequency asking questions. "Who was in that plane?" "Did he crash?" "Where is he?" "Hey, wasn't that—?"

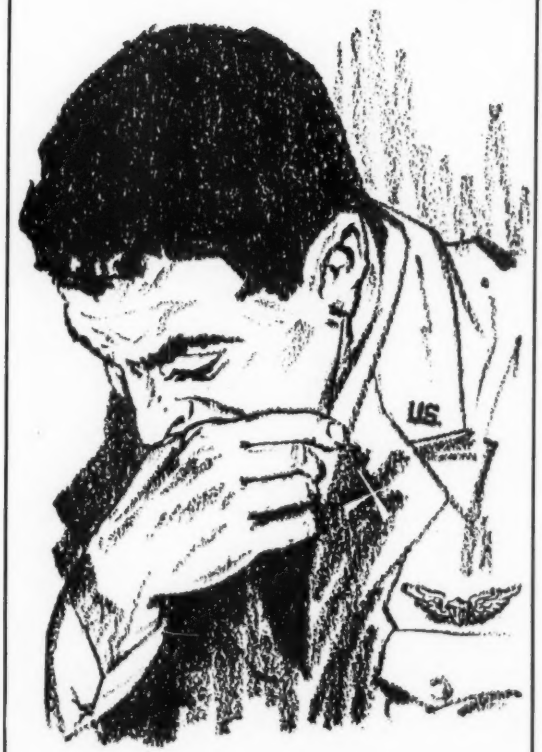
The landing was the best one I had made all day. No sooner had we rolled to a stop than an O-1 appeared overhead. I jumped out and gave him the high sign that all was O.K. My friend made a few remarks about how glad he was to be on the ground and I agreed.

I noted the time, knowing that I would have to file a crash facts message, and looked at the main fuel tank gauge. It indicated just less than a quarter of a tank. I got my flashlight out of my ditty bag and made a visual check of both tanks. Both were bone dry.

A truck arrived shortly with two 5-gallon cans of fuel. I had these put in the auxiliary because I didn't want to disturb the gauge of the main tank. Minutes later, I landed at base. I told the aviation officer about the faulty fuel gauge and he ordered the main fuel tank be removed. They soon had the answer. The control arm from the float to the gauge was attached to the float near the top instead of in the center where it should have been. Thus, when the float was on the bottom of the tank, the control arm was elevated so that it caused the gauge to read nearly one quarter full.

The aviation officer verbally kicked me in the pants for poor fuel management and for relying entirely on the fuel gauges. At the same time, he patted me on the back for not damaging the aircraft.

Once again, as I dodged ruts in the road from the airfield, I thought of the lesson I had learned that day and silently shouted, "Hurrah for glider strips!"



OVER THE HUMP

I FELT A definite sense of guilt when a friend of mine died a few years ago in an aircraft accident. As one of his supervisors at the time, I probably could have been instrumental in saving his life.

When I first arrived in the unit, it was winter and the way people drove on the wet narrow roads around the airfield was frightening. This pilot, in particular, impressed me as a daredevil type of individual. In fact, our first conversation after being introduced was about a race he had won with his expensive sports car.

After riding with him a few times it didn't surprise me to see him perform in the air in much the same manner as he did on the ground. I don't mean to imply that he was overtly dangerous, but at times he seemed to find his own answers to *school solutions*. There were days he would fly when the rest of us felt the weather was too bad. Somehow, he always seemed to get the weatherman to give him the required minimum forecast. Most of us believed that forecasting in that part of the world was little better than calculated guesswork. If the forecaster hesitated, coughed or appeared to hold anything back, we just didn't go. Not so with my friend.

He had a few close calls. On one occasion he landed with ice on his small aircraft and several times, when the hills were obscured, he took to the valleys and narrowly missed hitting low hanging

wires. He became known as a pilot who pushed his luck. Several times I was tempted to tell him he was taking too many chances, but I didn't. I remained silent because I was not his direct supervisor.

As the months passed we both moved around in the organization and eventually I became the CO. Simultaneously, I had word that I was to move the unit to the field and take part in a large maneuver. Safety suddenly took on a new and different aspect. I saw the safety chain stretching from top to bottom in the organization and began to worry about the weakest link.

The safety officer and I discussed this pilot at great length. We agreed that he had changed a great deal during recent months. He was engaged to be married and his fiancee seemed to have a calming effect on his behavior. A close call with weather also appeared to make him aware of the dangers of trying to maintain VFR in IFR conditions. There were other encouraging signs and we agreed that he was over the hump.

We moved to the field on schedule. This pilot's daily routine developed into a morning reconnaissance flight, lunch at base field and a repeat mission in the afternoon.

On the tenth day, 20 minutes after takeoff, he crashed, killing himself and his passenger. The accident investigation board rushed to the scene and their work was quick and thorough. One obvious clue was the total weight of the equipment in the aircraft. Adding the weight of the two men to the hodgepodge of weapons, wing covers and other miscellaneous items, they found the aircraft to be near the maximum allowable gross weight.

The board then discovered that someone had passed the word that any tail number turned in by an opposing aircraft to their ground element would constitute a *kill*. Further investigation revealed that the dead pilot was probably aware of this gaming technique. Witnesses were found and the board reconstituted the 20-minute flight.

They believed the pilot suddenly became aware of an *enemy* aircraft on his tail. He apparently realized someone was trying to copy his number. Because of his psychological makeup, it was their opinion that he was virtually unable to respond in any way, except to take evasive action. Knowing him as they did, they concluded that because of his aggressive approach to life, it was beyond him to just sit there and allow someone to turn in a *kill* on him.

A dogfight started. Altitudes during the chase varied from 1,000 feet to near ground level. He was in a tight turn just above the trees when he had a high speed stall. He rammed full throttle, trying to stop the spin that was developing, but it was too late. There wasn't enough altitude. The aircraft crashed in a vertical dive.

I believe that just about every unit has a pilot like my friend. If so, perhaps you can save him. I didn't.

If you have a question about personal equipment or rescue/survival gear, write Pearl, U.S. Army Board for Aviation Accident Research, Fort Rucker, Ala. 36360

PEARL'S

personal equipment and rescue/survival lowdown

EXCERPTS FROM report of UH-1 accident in which the pilot was killed by burn injuries and the instructor pilot sustained serious burn injuries: ". . . The pilot probably died from burns caused by the postcrash fire and not from the crash itself. He had no major fractures, punctures, etc., but did have a depressed area in the top of his skull. . . . His helmet, found near the aircraft, had not been burned. The visor was up and the straps were fastened, although the chin strap and nape strap were relatively loose. This suggests that he may have lost his helmet and perhaps his head whiplashed back against the seat. . . ."

". . . The IP had facial burns, chest and back burns, arm burns above the elbows, a burn around his waist and his buttocks and legs were burned above the knees. He had been wearing flight gloves and leather boots. . . . He was issued a fire protective jacket and pants, but was not wearing them. . . ."

"A one-time check of all aircrewmembers for properly fitted helmets was conducted by the flight surgeon. . . . Each newly assigned crewmember will have his helmet checked for proper fitting at the time the flight surgeon issues a medical clearance for flying."

Excerpts from the medical report of a UH-1 accident in which one passenger was killed and five passengers and two crewmembers sustained multiple lacerations and contusions: "All injuries sustained were secondary to the decelerative forces occurring at impact. The aircraft commander and pilot, fully restrained in their seats, were not injured. The crewchief and gunner were strapped in and had the least severe injuries. . . . The direct cause of the fatality, as for all the passenger injuries, was failure of the passengers to use any type of restraining device. The seats were in the stowed position. . . ."

From THE PROFESSIONAL, First Marine Aircraft Wing, August 1969:

The most recent addition to the 1st MAW assets is the AH-1G Huey Cobra. This two-seater aircraft is a helicopter gunship presently assigned to VMO-2. Because there is no cargo or passenger space in the Cobra, the only way to get a ride is to check out as a gunner/copilot or aircraft commander. However, the aircraft has been used in the past to rescue downed aircrewmen, and nobody would pass up the ride if it were the only one available.

The aircraft has no hoist, and has no capability for jungle rescues, but if you land in the unfriendly flat lands, and the Cobra lands next to you, hop aboard. It'll take you to the nearest safe area and you can hitchhike from there.

How do you get aboard? Directly below the pilot, on either side of the aircraft, there is an ammunition bay door. It is secured by two normal thumb type fasteners. When opened, the top of the door swings down to a level position where it is held by two cables. To get a free ride home, open the ammo bay door, lie down on the opened ammo door, slip your arms and feet under the cable and hold on. Or, you may sit on it if there are more than one downed crewman. There may be a gunner's belt inside the ammunition bay to help you secure yourself to the helicopter.

The alternate way of getting aboard is to straddle one of the large rocket pods which are mounted inboard on the stub wings. Straddle the front of the pod facing aft and hold on to the wing stubs.

The ride will be thrilling, but the U.S. Army has effected several rescues in this manner with no injuries to the rescued aircrewmen. If you end up on unfriendly ground, don't just stand there and wave when the Cobra lands next to you. Hop aboard and hold on—TIGHT.

NEW INFORMATION ON SURVIVAL KITS

In the August issue, reference was made to the Survival Kit, Leg Holster, Individual (FSN 8465-935-4728), in my letter to CW2 Daniel L. Britt. Since that time, a decision has been made not to purchase this kit. Procurement action is under way to provide the Air Force type SRU-21/P survival vest to SEA in limited quantities and CDC has been given the task to generate a requirement for a survival kit/vest to be type classified and usable worldwide.

PLEASE CUT ALONG LINE AND DISPLAY IN PROMINENT PLACE

Whether you have and fail to use it,
Despise and hope you lose it,
Didn't help the Army choose it,
Or just plain downright refuse it,
Correctly fitted protective gear,
Worn and used on *EVERY* flight,
Will help to keep you here!
I hope *YOU* see the light!
Pearl

P.S. Passengers deserve your attention.
See they're given belt retention!

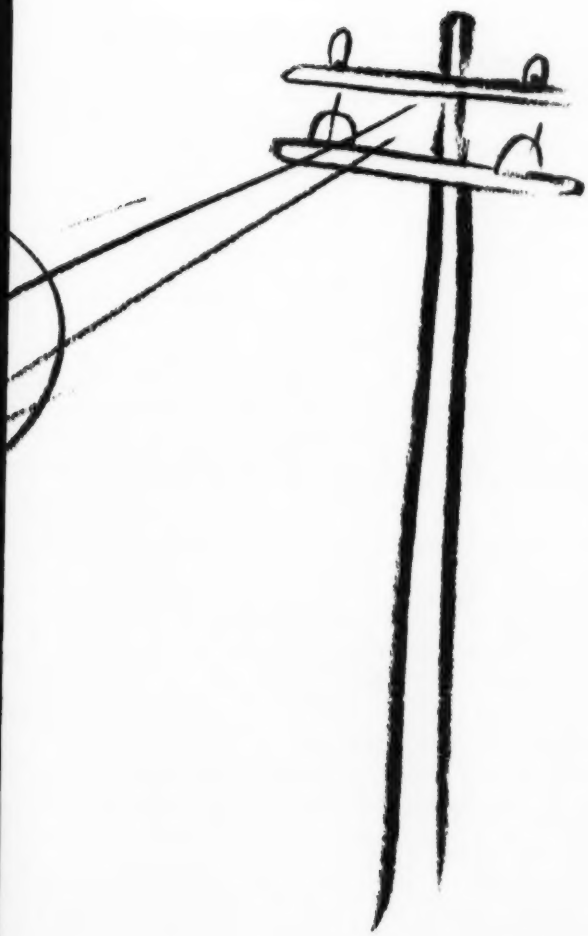
DECEMBER

SUN	MON	TUES	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

LOW FLYING SENSE

Adapted from DA Pam 95-1 February 1958

Major Chester Goolrick



THE CLOSER YOU LOOK at any tricky problem, the simpler it gets. Something which appears to have more angles than a carnival con game is likely to break down into a pretty tame proposition *if* you *bother* to break it down.

Nobody is going to argue that low-level flying, the kind the Army has to do, is a simple matter. On the other hand, doing it the right way is not as complicated as it might seem to the novice.

There are all kinds of *results* of accident prevention violations. Pilots can end up roosting in trees like crows, floating down the Mississippi like the Robert E. Lee, or festooned with high tension wire like a drunken spaghetti eater. The thing that puts them in the pickle barrel to begin with is almost always the same. To put it not too kindly, somewhere along the line they goof off.

A goof-off is the result of carelessness, ignorance, or forgetfulness. When a goof-off occurs, the pilot can look around as long and as hard as he wants to, but he won't be able to find anybody to blame but himself.

The Army does everything it can to take care of the mechanical aspects. It retired the Curtiss Jenny from operational flying a number of years back. Its aircraft are built and maintained so as to stay in the air as long as the pilot will let them.

It's the human element that's the tricky part. The old case of the nut behind the wheel being the weakest part of the machine.

Learning *everything* about accident prevention is the best way of keeping the nut from getting loose.

PRIDE GOETH BEFORE . . .

There is no place in the Army for a hotshot Charlie. The day of the flying circus is definitely over. Every now and then some dimwit might get through the screening system and survive long enough to give his CO more grey hairs than his quota calls for but—if he's lucky—the Army gets rid of him before he does the job himself. Anyway, trying to tell somebody like that about accident prevention is like trying to train a rabbit to eat beefsteak. It ain't the nature of the animal.

Neither does the Army want any Cautious Cals. Operational flying, like any military activity, occasionally calls for extra risks to be taken. Pilots have got to be ready to take those risks, relying on their long training, their physical well-being, their aircraft and their *constant reliance on accident prevention procedures* to get them out of the stickiest situations. It's in the last part that the goof-off can occur.

Every pilot can look back on *the* close shave of his flying career. He may be a model husband and flyer. His reflexes may be the admiration of the

LOW FLYING SENSE

The Eager Beaver out to prove himself . . . no mountain or smokestack is going to hold him back . . .

medics. His instructor may have wept with joy after his first solo. Somewhere along the line, though, he'll drop his guard for just an instant. If he's alert, his guard won't have been dropped too low.

And you can bet he'll never make the same mistake again.

EAGER BEAVER OR WEARY WILLIE?

As long as they continue turning out human beings in the present Mark One version, everybody is going to be subject to an occasional lapse. The model has not been perfected, not by a long shot. There are two kinds of pilots, though, whose lapse-rating is likely to run a little higher than average. One is the Eager Beaver, the fledgling who is out to prove himself. No little ol' mountain or little ol' smokestack is going to hold *him* back, by George! The other is the Weary Willie, the guy who's been around since they started making airplanes. He knows the mountain and the smokestack are there, but he keeps forgetting.

E. B. sometimes can be helped by a nice chat with his CO. W.W. can profit by having a long talk with himself. Neither of them needs to pay any more, or less, attention to the rules than anybody else. *Everybody has got to be as careful as he can be all the time.*

STEP UP CLOSER, GENTS

Just what is involved in accident prevention? Basically, the pilot's correct appraisal at any time of four things:

1. his aircraft;
2. himself;
3. the situation;
4. all of the above.

Look at No. 1 first. No two airplanes or helicopters, even of the same type and model, are going

to behave in identical fashion in every instance. They are a little like horses in that respect. All the nags at race tracks look more or less alike, but as many a saddened man at the two-dollar window can tell you, some run faster than others. The owner of a thoroughbred who puts it into a steeplechase where the jumps are too high for it is going to end up with some glue factory material on his hands.

A pilot who through carelessness or ignorance asks his aircraft to do something it wasn't made to do is different from a horse owner. In this instance, it's the *pilot* who goes to the glue factory. Sometimes you can fix the aircraft.

Flying the aircraft itself is one way of seeing how high a hurdle it will take. Another is to read anything and everything that has been written on the subject. And there are the old hands. If you *really* want to know what it will do—*ASK THE GUY WHO FLIES ONE.*

Familiarity, however, isn't enough all by itself. Proof of this is the fact that some accidents involve aircraft in which your Aunt Amanda could check out in after a long weekend of instruction. Pilots, being human, are likely to take too much for granted unless they watch themselves. Or they overlook new factors which can alter their aircraft's behavior. It doesn't take much to change—and for the worse—the way aircraft behave. Objects dropped, thrown or blown from inside aircraft have been known to interfere with rotors or controls long enough to cause accidents at low altitudes. It's a good idea to see that map cases, thermos jugs, jackets and other odd gear are secured so they'll stay where they belong.

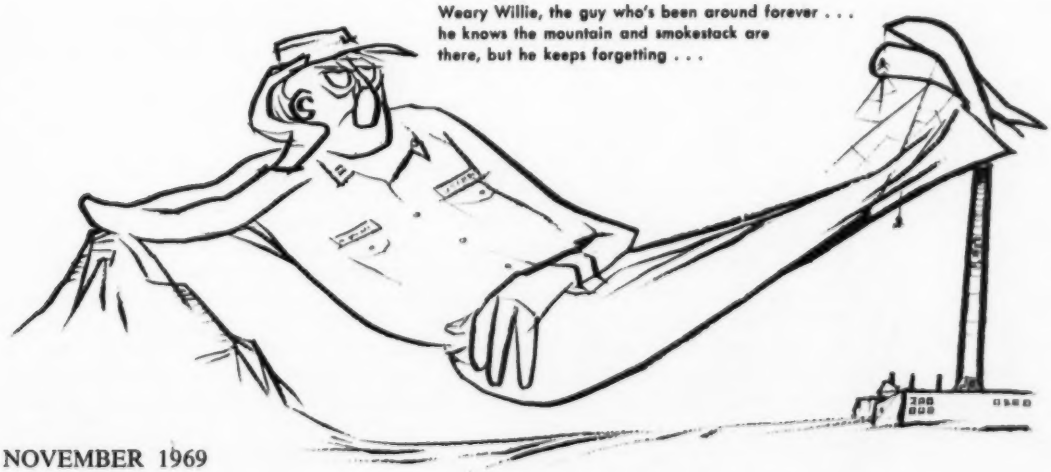
The men who fly helicopters have a greater problem than those flying airplanes. One-armed paper hangers lead comparatively sedentary lives compared

"He who hoots with the owls at night cannot soar with the eagles at dawn"

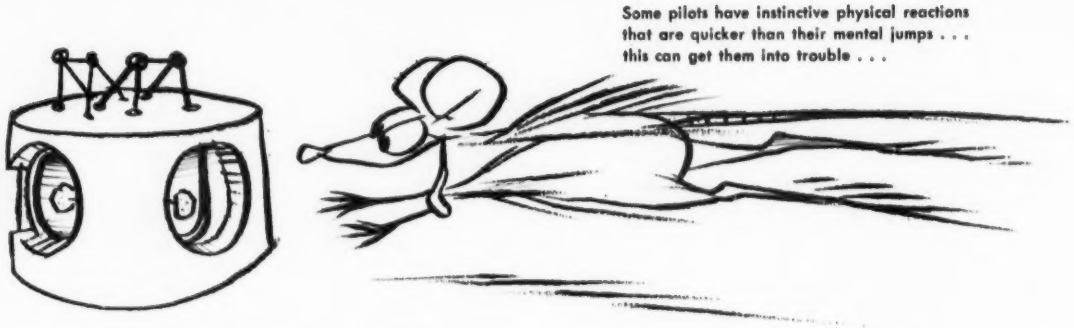
to helicopter men. The 'copter pilots have got to know their machines, *every* quirk.

Dozens of little things about particular aircraft can be helpful in a nasty situation—*if* the pilot knows them. Stall characteristics. Cockpit visibility and blind spots. Glide and landing behavior. How a helicopter is likely to react in an emergency. Again, it comes back to horses. Just as a competent jockey learns to sense his mount's actions through the reins, a pilot must strive to develop "Control Touch"—the ability to feel through the controls what his aircraft is about to do in the next moment. *No competent pilot ever loses control of his aircraft during the execution of a normal maneuver. No competent pilot ever deliberately exceeds the limitations of his aircraft.*

Weary Willie, the guy who's been around forever . . . he knows the mountain and smokestack are there, but he keeps forgetting . . .



LOW FLYING SENSE


Some pilots have instinctive physical reactions
that are quicker than their mental jumps . . .
this can get them into trouble . . .

CLEAR EYED AND BUSHY TAILED

There is an old saying: "He who hoots with the owls at night cannot soar with the eagles at dawn." Sunday morning golfers are aware of this. The fellow who closes up the country club bar on Saturday night is going to be lucky if his drives average more than 25 yards the next morning. The pilot who climbs into the cockpit with the inside of his mouth tasting as if the whole Russian army had marched through it is hardly in shape to carry out any tricky low-level mission.

Alcohol, fatigue, overeating, even excessive smoking, are pilots' deadly enemies. Anybody with a real, deep-seated desire to get back home in one piece should avoid them if he knows he has got to fly.

Oh, it's jolly to be where the wine flows red
But likker's no fun if you're also dead.

Even the all-America types, the lads who haven't even a nodding acquaintance with John Barleycorn and who actually got a gold watch for not smoking until they reached 21, have their limitations. A pilot is the best judge of these limitations. Unit training now is almost always arranged so that the fledgling just out of school gets a good dose of indoctrination before being assigned to missions. Occasionally, though, a unit might be so short-handed that a youngster with no experience may be thrown into mission flying right off the bat. A pilot forced into such a sink or swim position can get by only if he remembers every rule he's been taught. Also, if he's honest with himself he won't try what he knows he can't do. Nobody who has trouble negotiating the length of the "Y" pool is going to try to swim the English channel, unless he's lost his marbles.

Every pilot should know himself as fully as possible. Some people, for instance, have instinctive physical reactions that are quicker than their mental jumps. This can get them into trouble unless the instincts are trained to provide the proper reaction. Reaction times themselves can differ in a person. A pilot who has personal worries or who isn't up to snuff physically is not likely to react in his normal fashion. The extra interval could make a big difference if he failed to take things into account.

The simple desire to keep a whole skin can also constitute a danger. All the so-called normal instincts for self-preservation are opposed to safe flying. One is the blinding desire to get down which can overwhelm a pilot in an emergency. Another is the instinct to haul back hard on the stick when the nose is down in a stall or spin. Another, the desire to grab hold of something and hold on in an emergency. Panic—when self-preservation takes over—can seize *anybody,* no matter how experienced, unless he has cultivated certain characteristics. These are:

1. POISE . . . the ability to maintain mental and physical control while under pressure.
2. JUDGMENT . . . the ability to size up a situation correctly and take proper action.
3. SELF-RELIANCE . . . the willingness to take action in the absence of advice.
4. AGGRESSIVENESS . . . or, Don't-Just-Sit-There-ishness.

The fellow who cultivates all these is the kind who wouldn't mind spending a night alone chained in the dungeon of a haunted castle.

He is also a good, competent pilot.

CASE THE JOINT

The burglar who fails to case the joint thoroughly before trying to relieve the First National Bank of most of its liquid assets stands a good chance of pulling a long stretch up the river. Further, a good competent burglar not only knows how to get *in* the bank, he knows to the split second what he is going to do *while* he is in and how he is going to make his getaway once the alarm begins to jangle and the sirens to howl. Burglars who pay attention to these details are sometimes able to spend their declining

years in such places as Acapulco or Miami Beach, rather than Sing Sing. But a life of crime is not to be condoned. Besides, most burglars *do* get caught. Just the same, an Army pilot facing a mission can borrow a trick or two from the burglar's technique, by paying rigid attention to three rules:

1. *Always* know *exactly* what you're going into.
2. *Never* let *anything* distract you from the job at hand.
3. *Never* go into any situation without planning in advance how to get out.

The value of exact prior knowledge about the kind of country a pilot is going to have to fly over can hardly be overstated. This is one case where approximate knowledge can often be little better than none at all. Banking on complete knowledge of what the area *was* like a little while ago can be dangerous, too. For one thing, man—busy little beaver that he is—is constantly changing things to suit himself. High tension wires are strung high above valleys. Television towers mount into the sky. Smokestacks seem to become more numerous daily. And the word about them is sometimes slow in getting around.

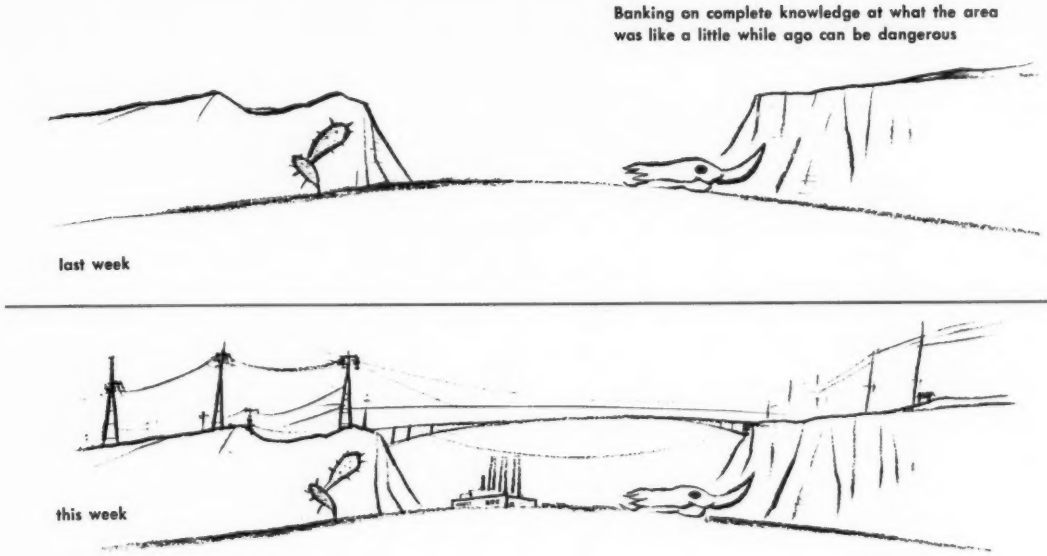
Prior reconnaissance from a good safe height is, of course, the best way to make sure that the terrain to be flown over is free of such hazards. Here the pilot—and his observer if he has one—have got to be extra careful. Wires, perhaps the most dangerous of all man-made obstacles, are also the most difficult to see. They are particularly hard to spot over water or snow.

NOBODY CAN AFFORD TO MAKE ANY ASSUMPTIONS ABOUT HIGH WIRES—OR ANYTHING ELSE. *The lad who hurls himself full bore down a valley or along a river unless he knows for certain there isn't anything in the way is likely to get the trouble he's asking for.*

Higher altitude reconnaissance, incidentally, carries with it dangers of its own unless the pilot knows what he is doing. A *sudden shift* from higher up to low-level flying can bring a pilot suddenly up against things he hadn't been able to see from above. It's wise to make the transition gradually and over an area known to be clear.

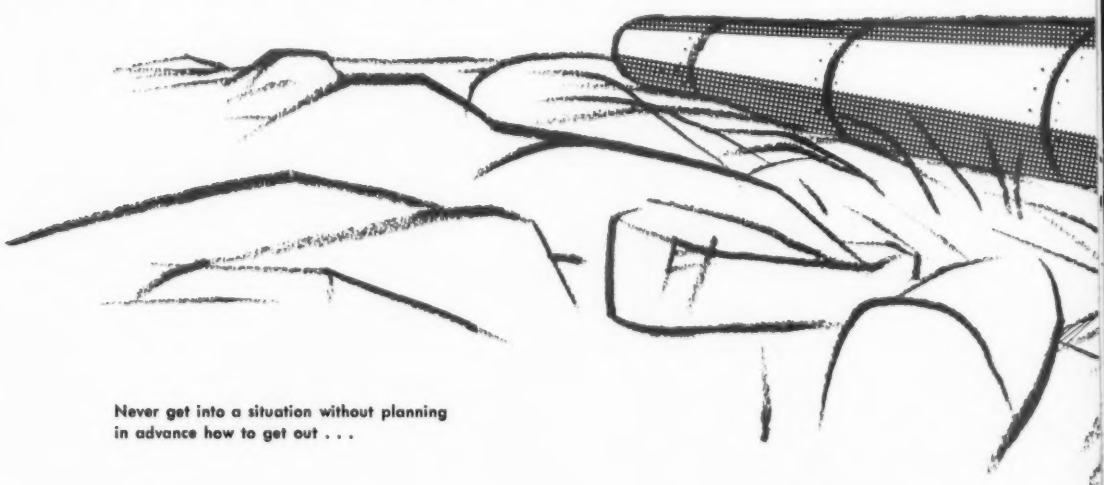
Careful prior reconnaissance might not always be possible, particularly in combat. There'll almost al-

LOW FLYING SENSE



ways be a trail-blazer around, though, the fellow who had to fly over it the first time. He'll know where the sand traps are. He can be a useful source of information. Unless he's down on mankind in general he'll be glad to give it. But he has to know the other fellow wants and needs the information he has. If *you're* the other fellow, hunt him up and ask him.

Maps, finally, can be counted on to give the basic features of the land. They provide a good starting point for learning about what hazards and pitfalls the mission is going to be confronted with. Maps, however, have a way of getting dated. The man who starts out today on a cross-country auto trip armed with a copy of the 1922 *Motorists Guide* is likely to wind up hopelessly lost in the jungles of northern Kentucky. The pilot who foolishly assumes that his map is guaranteed to be the last word could find himself ungracefully draped around a TV tower that somebody threw up between noon and the cocktail hour last Thursday.



Never get into a situation without planning in advance how to get out . . .

Casing the joint, pumping the other fellow, maps —all play their proper part in providing a pilot with The Last Word on what he is getting into. Nobody can afford to overlook any of them.

NO WOOL GATHERERS

Once he is committed to a mission, the pilot can allow nothing to distract him from his work. There was the case of one pilot whose observer was a wonderful conversationalist. He was a real joy to have along. Never a dull moment. One day during a detailed description of the charms of Tessie, the hat check girl at the Club Bebop, the poor pilot flew the two of them into the side of a hill. Conversation is but one way a pilot can be distracted from the job at hand. Sheer boredom can make the mind go wool-gathering. Worry can do the same. Whatever the cause, wool-gathering can be an exceedingly risky cockpit occupation.

On the other hand, it is possible to pay *too much* attention to the mission. No pilot should ever forget that his primary job is to fly the aircraft. The success of any mission depends on how well he does that. Allowing the mission to take precedence over flying has brought disaster. There was the case of a pilot who had been assigned a simulated bombing mission against some troops deployed along one bank of a river. The pilot carried out the mission splendidly. In fact, he grew so engrossed in it, looking down over the side, that he failed to observe that the river curved to the left up ahead. So he flew into the opposite bank.

Another, trying to make a message drop while flying solo, inadvertently turned slightly from his intended flight path. He ran into a flagpole he hadn't seen. The comments of his CO and the aircraft accident investigation board are best left to your imagination. *Danger nearly always lies ahead. No flagpole ever sneaked up on anybody from behind.*

Every Army pilot knows that the kind of flying he is called on to do is a rough assignment. Nobody in his right mind is going to operate at the low levels Army flyers generally have to unless it's in the line of duty. The boys in the jets up at 30,000 feet have troubles of their own, but at least they have room to operate in. The Army's job, much lower down, is just as demanding and even more nerve-wracking. A good deal of Army flying is carried on under 500 feet and the helicopters are barely skimming the treetops. This complicates things. At low levels, a pilot really can't see a long way ahead. This makes navigation trickier, for one thing. It takes more out of a pilot, for another, making concentration hard. To compensate, the Army pilot has got to be as quick on his mental feet as a cat. He has got to be prepared to deal with things that can pop out at him with the suddenness of ducks in a shooting gallery. Reconnaissance and forethought can help sharpen him. The rest is up to his trained reflexes *and his alertness.*

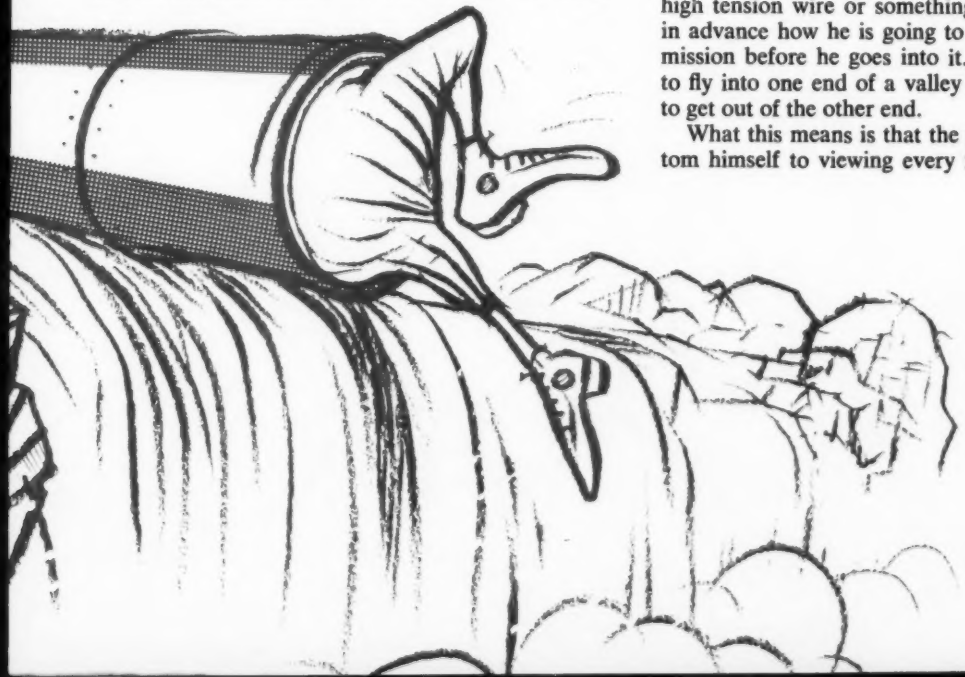
A good rule is to assume the worst lies up ahead and be prepared to deal with it. That's the way to stay in the air. No mission was ever completed in an aircraft which had come to rest in the top of a pine tree.

GOING HOME

American Indians back in the frontier days had a rule that quite often kept their scalps from being lifted. Army pilots can keep their own scalps by borrowing it. When plotting a raid on an opposing tribe, the Indians always mapped out in advance the route home in order to avoid ambush.

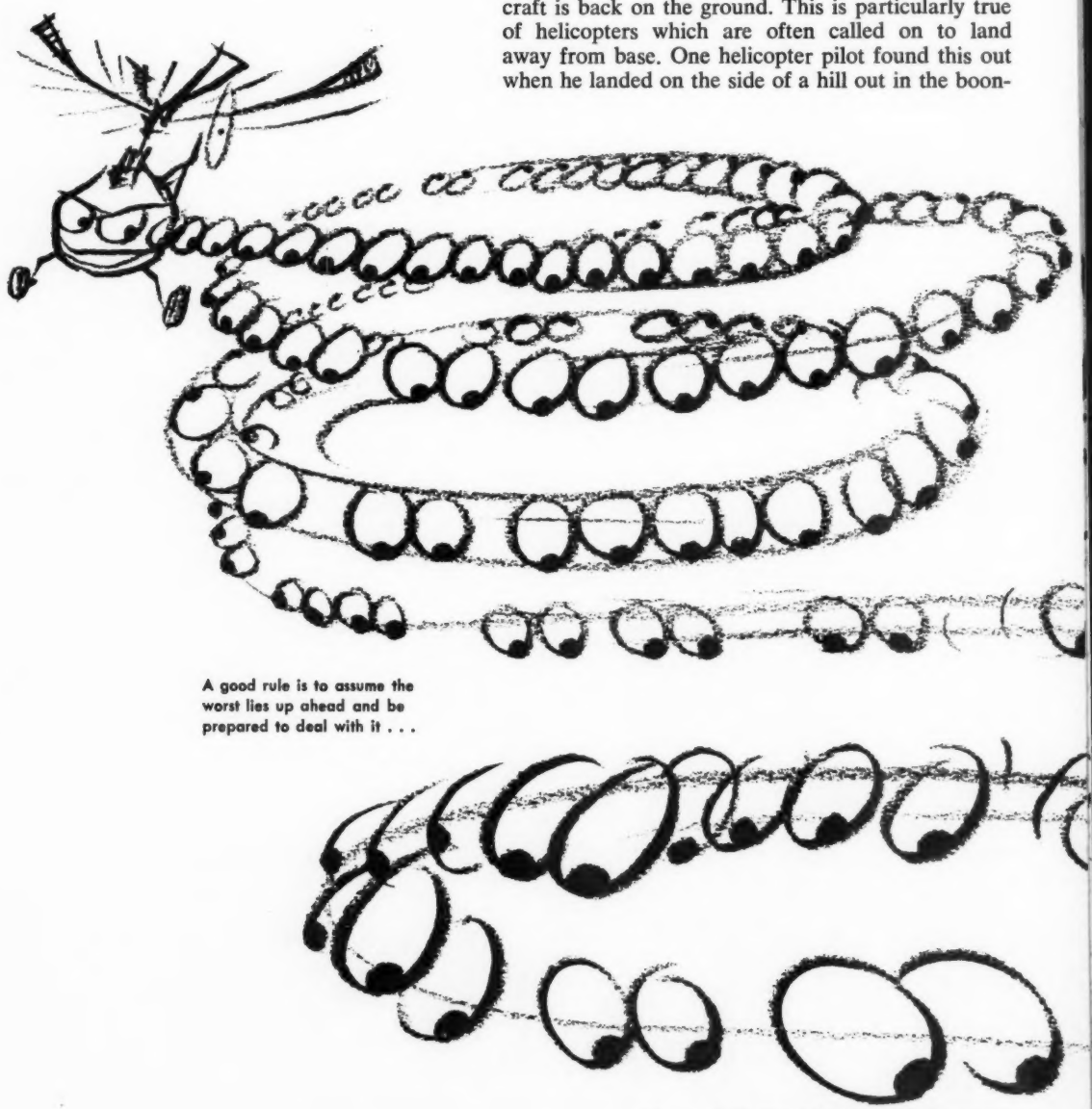
The pilot who doesn't want to be ambushed by a high tension wire or something similar should know in advance how he is going to get out of a low-level mission before he goes into it. It doesn't help much to fly into one end of a valley without knowing how to get out of the other end.

What this means is that the pilot has got to accustom himself to viewing every flight *as a whole.* The



mission doesn't consist merely of the medevac pick-up, or the recon, or the troop or cargo-carrying. The mission begins the second the pilot climbs in the aircraft. It comes to an end the second he gets out back at the base. The pilot who tries to blow down the C.P. on his return to base is taking one way of letting the people on the ground know he's back home. He's just as guilty of an accident prevention violation as the fellow who knocks over a television tower. After all, many aircraft accidents take place during what started out as routine landings.

Sometimes a mission isn't over even after the aircraft is back on the ground. This is particularly true of helicopters which are often called on to land away from base. One helicopter pilot found this out when he landed on the side of a hill out in the boon-



A good rule is to assume the worst lies up ahead and be prepared to deal with it . . .

docks and went off to look for some people without bothering to shut his chopper down or secure it. There was a stiff wind blowing and when he got back he found the 'copter had flown off all by itself. It was most embarrassing, as he later tried to explain to his CO.

THE LITTLE THINGS

If an Army pilot could retain only one fact he could do worse than remember this:

AIRCRAFT ACCIDENTS USUALLY RESULT FROM A COMBINATION OF SEVERAL SMALL ERRORS RATHER THAN ONE LARGE ERROR.

Paying attention to every detail keeps the errors from mounting up. Nobody can be perfect all the time. Everybody is going to pull a blooper once in a while. One small error may not make much difference if it is recognized and corrected in time by an alert pilot. Several errors laid end to end by a pilot who doesn't have his mind on his business can end in something pretty messy.

The pilot should take the same attitude toward his flying that he does toward his best girl.

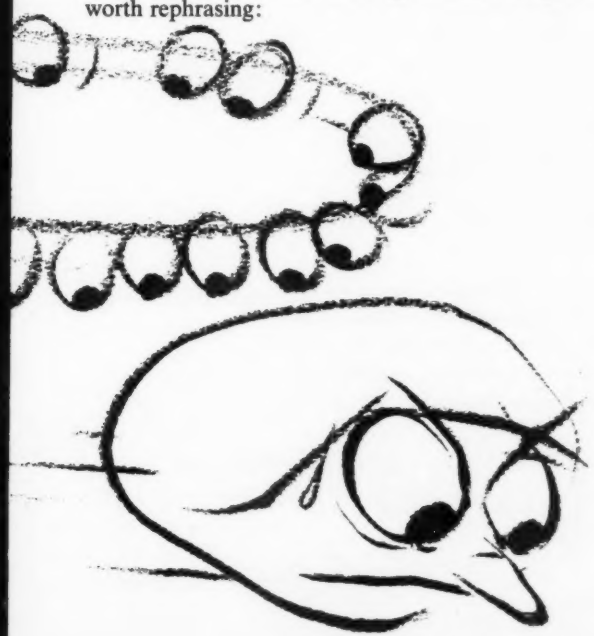
It's the little things that count.

SO IT'S REALLY SIMPLE

Knowing that he has the best training money can buy and that he has been handpicked for his ability, the pilot should approach his job confidently and with his eyes open.

Once he remembers that accident prevention is really simple the job becomes easier. It becomes even easier if he is aware that prevention is something he has to *stay on top of all the time*. Accidents can happen in almost no time at all.

The basic rules that make prevention simple are worth rephrasing:



1. KNOW YOURSELF—*If you can't do something, or haven't yet learned how, admit it.*

2. KNOW WHAT YOU ARE DOING—*Blind man's buff is a peachy game for children's parties. The pilot who plays it in the cockpit of an aircraft is risking damage to some valuable property.*

3. BE ALERT—*You can afford to make a wrong turn while daydreaming if you are strolling down to the corner store. A wrong turn in the sky can bring the aircraft into contact with something more solid than air.*

4. KNOW YOUR AIRCRAFT—*A piece of machinery has no way of telling anybody it can't do something. A pilot has got to know in advance the limitations and behavior patterns of his aircraft. Experimenting while carrying out a mission at tree-top level is no way of finding out.*

5. NEVER GO ALL OUT—*The competent pilot always holds back a reserve both mechanical and physical. Burning the candle at both ends may result in a brighter light for a while, but the candle doesn't last very long. The pilot who pushes himself and his aircraft isn't going to last very long either. It's not only that he doesn't have a reserve he can call on when danger threatens. The man who is pushing himself too hard and too fast is error prone. Going all out, he fails to notice the little mistakes as they accumulate. When enough errors have piled up without his noticing them, the accident takes place.*

IT'S MEN'S WORK

The Army separates the men from the boys *before* it teaches them to be pilots. Flying Army aircraft is a tough, exacting, and often dangerous game. It is a game that asks many things of the men who engage in it—things that often come more from experience than from training.

It is a game that in the end demands more than anything else full maturity and a sense of responsibility. An Army pilot's role is important. In combat the way he carries it out can be vital to the success of great operations. In his hands can rest the fate of many men on the ground below him.

This is something no pilot can lose sight of for even an instant. This is why the pilot in the end must be the final judge of what he can or cannot do. This is why the people on the ground respect him when he says a mission is beyond his capabilities. They know that Army pilots give their best all the time. They also know that a mission that ends in an accident is worse than no mission at all.

The pilot who keeps a large red neon sign saying "ACCIDENT PREVENTION" tucked away somewhere in his head is the pilot who is going to do his work successfully.

It is pretty important work.

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

The responsibility for knowing your authorized radar minimum altitude
The importance of giving complete IFR reports
Distribution of the Facility Management Handbook

On Radar Minimums: Each aviator is responsible for knowing what his authorized radar minimum altitude (DH/MDA) is. Descent below the appropriate minimum is not authorized even though the controller may continue to provide azimuth and altitude information. This does not override the aviator's authority to cancel his IFR flight plan if operating in VFR conditions; his authority to descend if the runway environment is in sight; or the aviator's authority when operating in emergency conditions. During training or flight evaluation, instructors and examiners usually expect a level-off at MDA (ASR) and an execution of the missed approach at the Missed Approach Point (MAP); (DH for PAR). When in doubt, find out—be prepared for options which may be available.

On IFR Position Reporting: Correct position reporting helps to eliminate pilot/controller confusion, reduces radio frequency congestion and, in many instances, expedites flights. Types of reports to be rendered vary, depending upon the flight situation. For example, an aviator flying in a non-radar environment, or in a radar environment but not under radar surveillance, should be prepared to give a complete IFR report at compulsory reporting points, or at fixes identified on the flight plan, or designated by their being issued in the ATC clearance.

Aviators flying in a radar environment when under radar surveillance are expected to give only the aircraft identification and the altitude that is being maintained. This information may be be given on the initial callup to reduce radio frequency congestion.

When an aviator has been requested to report over a specific fix for radar identification, he should give only his aircraft identification, the name of the fix and the altitude being maintained.

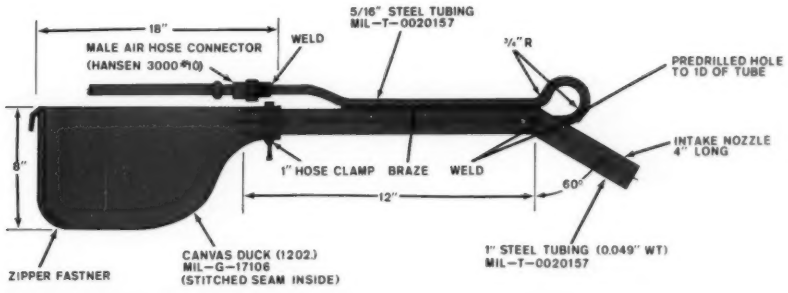
When changing from one controller to another in the same ATC center area, all that is usually required for a report (which may be the initial contact) is the aircraft identification and altitude being maintained. The change of radar control from one ATC center to the next is normally executed at a designated enroute fix. When this occurs, the name of the fix should be included between the aircraft identification and the altitude information.

When an aviator has been notified that radar contract has been lost, he is expected to give full IFR reports until radar contact is re-established.

> **NOTE: On initial callup and on each handoff, radar controllers are expected to advise the aviator that his aircraft is or is not in radar contact. Also, upon losing radar contact the controller is expected to advise the aviator as soon as possible. This alerts the aviator to the type of position reports he must give and whether separation is being maintained by radar or manual procedures.**

FAA Publications: The FAA Manual 7230.1, Facility Operations, has been renumbered and renamed. It is now 7210.3, Facility Management Handbook, and distribution is being made to all those subscribers who were on the distribution list for the 7230.1.

Maintenance Tips



We're always on the lookout for gadgets to make the job easier. Here's one the old pro maintenance guys will remember from the days of the Army Air Corps.

This locally fabricated vacuum cleaner will operate from compressor air and can be used out on the flight line. It can be built from readily available materials and the effort is nothing more than a little scrounging, a little welding and a little hemstitching. You'll find it particularly effective in removing small foreign objects from those hard-to-reach areas of the cockpit. Add a length of flexible hose to the nozzle and it will be even more useful in the corners and crevices.

Any tool that will help in corrosion prevention and FOD prevention is worth the time it takes to make it and the time it takes to use it. It may even prevent a jammed control from occurring more than once.

Reprinted from Northrop's F-5 SERVICE NEWS

Do-It-Yourself Vacuum Cleaner

Low Flying Sense,
page 54